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JOHNS HOPKINS SPECTROSCOPIC REPORT NUMBER 17

THE FIRST AND SECOND POSITIVE BANDS OF N_2

by

G. H. Dieke and D. F. Heath

The Johns Hopkins University
Department of Physics
Baltimore, Maryland

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ABSTRACT

The first and second positive groups of N_2 ~~have been~~ were photographed with a low pressure discharge cooled with liquid nitrogen and better resolution achieved than in previous work. The rotational analysis of 21 bands of the first and 9 of the second positive group has yielded the energy levels of $A^3\Sigma$ to v = 12, of $B^3\Pi$ to v = 18 and of $C^3\Pi$ to v = 4 to within about 0.01 cm^{-1} relative to each other and to within about 1 cm^{-1} with respect to the normal state of the molecule. With these levels the lines in all other bands can be calculated to within the limits of experimental errors. In the second positive group a number of weak satellite branches were found that have not been observed before.

Exposures at higher temperatures and an afterglow in argon have yielded more information about the perturbations of the $C^3\Pi$ state. The anomalous intensities in these perturbations ~~have been~~ were interpreted as abnormal occupation of the upper states rather than abnormal transition probabilities. The deviations from thermal equilibrium promise interesting information about the excitation mechanism of the second positive group.

CONTENTS

1. Introduction

The spectrum of N_2 is one of the most extensively investigated molecular spectra. Nevertheless there are still many imperfectly analyzed features. Moreover the results of the previous investigations have often been published in a form that offers no real help to later investigators who want to revise an analysis or deal with features not included in the earlier work.

The growing importance of upper air research has made it desirable to have all fundamental data on the N_2 spectrum readily available. We have therefore started on a revised analysis of some parts of the spectra of the constitutents of air in order to provide such data. The present report deals with the first and second positive groups of N_2 which form the overwhelmingly conspicuous features in the spectrum of a discharge in N_2 or air in the visible and the near ultraviolet and infrared.

For the excitation of these two band systems see a previous report (Heath, 1959). The present report gives new measurements of parts of the two systems with improved resolution and accuracy, an analysis of the measured bands and a number of features emerging from the analysis.

2. Experimental Procedure

The complexity of the first positive group and, to a smaller extent, also that of the second group is the greatest handicap to a successful analysis. There are unavoidably many overlappings and close blends which even spectrographs with the highest available resolution cannot resolve. Much improvement can be accomplished by obtaining the spectra at low temperatures and accordingly most of our spectra were photographed in a low pressure (< 0.01 mm) nitrogen discharge tube immersed in liquid nitrogen. The rotational structure is then contracted to such a degree that in the 2nd group all neighboring bands are completely separated. Even in the first positive group this is true at the long wavelength end. At the shorter wavelengths, where the bands are more crowded there is still some overlapping but it is no more very serious. In all cases the low-lying lines are strengthened so much that there is no difficulty in their proper identification. The low pressure and low temperature has a favorable effect on the sharpness of the lines so that in most cases our resolution is better than that of previous observers.

The excitation of the discharge was by external electrodes and a 200 megacycle oscillator. The brightness was adequate so that even the weaker bands appeared satisfactorily with an exposure of a few hours.

The bands were photographed with a 21 foot grating in a Paschen mounting. The grating, a new B and L original grating, has a width of 7 inches and 30 000 lines per inch and, for most regions of the spectrum,

about 70% of the theoretical resolving power. The dispersion is about 1.2 Å/mm in the first order. It was used in the second and third orders for the second positive group in the first order for the first group.

That our resolution is better than obtained by previous workers is shown by the fact that we can resolve clearly the Λ -doubling in the R_2 branches* of the second positive group which have been reported as unresolved lines in all previous work. The accuracy of our wavelength measurements should also be better than that of most previous observers.

Enough bands were measured to obtain virtually all the known vibrational and rotational levels of the three electronic states $A^3\Sigma$, $B^3\Pi$, $C^3\Pi$ which are involved in the first and second positive groups of nitrogen. In general such bands were chosen for measurement as to give the best possibility for complete resolution of the rotational structure. The rotational analysis of many of them is given here for the first time. We made it a point however to measure a few bands reported in the literature in order to have a basis for comparison with previous work.

In general our low temperature discharge conditions made it possible to obtain the rotational levels to not higher than $J = 15$, but there was no difficulty whatsoever to obtain the lowest rotational levels in each case which often have been absent from previous analyses or uncertain.

We have made an attempt at completeness only insofar as the lower rotational levels are concerned. There are many additional bands with excellent resolution on our plates which could easily been analysed if time would have permitted this. These additional bands would however furnish no new levels and the frequencies of all their lines can be easily calculated from the energy levels given in tables 5-7. We have assured ourselves by analyzing a few such bands with known initial and final levels that the lines so calculated agree well (to within a few times 0.01 cm^{-1}) with the observed ones.

Tables 1 and 2 show the bands with the rotational structure given in this report and those analyzed by previous observers.

The low temperature condition of the bands is the one expected in the upper atmosphere. We have also photographed the bands at progressively higher rotational temperatures. This is most easily accomplished by photographing them at higher gas pressures. This much more effectively raises the temperature of the gas in the discharge tube through collisions with excited molecules than raising the ambient temperature. Only very few bands, the 2-0 band and part of the 7-6 band of the first positive

*For the rotation see Section 3

group and the 0-3, 1-4, 3-7, 4-8 bands of the second group were measured and analyzed under these conditions.

No attempt was made to measure plates on which the bands were most strongly exposed. Practically all bands could be obtained easily with such a strength that all but the faintest lines would be heavily over-exposed. Measurements were usually made on plates where the main part of the band was suitably exposed.

At the higher pressures the lines are noticeably less sharp. Even higher rotational temperatures than in a discharge tube can be obtained by taking an arc in nitrogen at atmospheric pressure. No advantage would have accrued from this because of the increased diffuseness of the lines. Moreover the lines coming from the higher rotational levels would have coincided with the crowded parts of the next strong band to shorter wave-lengths. (For instance those of the $0 \longrightarrow 0$ band with the strong parts of 1-0, those of $0 \longrightarrow 1$ with 0-0, etc.)

The variability of the relative intensity of the first positive group with respect to that of the second as well as the vibrational distribution has been dealt with in another report (Heath, 1959).

The afterglow of N_2 excited by argon has the property that it suppresses the second positive group but brings out the first positive group strongly.

The experimental arrangement is as follows (Fig. 1): The gas is introduced into the afterglow chamber through a Y-shaped tube. Through one arm flows nitrogen through the other argon. The gas pressure in the chamber is about 5 mm. The N_2 content of the mixture can be widely varied by adjusting the relative flow rates. When the argon is excited by external electrodes in its arm of the Y-shaped tube,a blue cone is observed showing mostly the 2nd positive group where the A and N_2 streams unite, and further downstream a bright yellow glow in which the first positive group and the first negative N_2^+ bands are strong but the second positive group weak with some marked intensity anomalies (see Section 9). There are other pecu-larities in the spectrum of this afterglow which will be discussed together with the excitation mechanism in a subsequent report.

3. Notation

In the literature different notations have been used for the first and second positive groups. It is actually immaterial which notation is employed as long as it is consistent and convenient.

We designate with a subscript 1, 2, or 3 the spin states for which for large values of K

(1) $J = K + 1$ (2) $J = K$ (3) $J = K-1$

For large J (Hund's case b) both J and K are good quantum numbers. For small J (except for Σ-states) K loses its meaning and only J is a constant of the motion. Nevertheless K can be used for the numbering of the levels, if desired. It may then however acquire negative values (as for instance for the Π_1 state). The notation outlined here is natural for a $^3\Sigma$ state and usually has been used by those dealing with the first positive group. It will be employed here for this group.

For Π states the value $\Omega = 0, 1, 2$ of the component of the electronic angular momentum along the internuclear axis has been used as an index to the level symbols, e. g. Π_0, and these numbers have in the past been generally used as indices to distinguish the triplet components, e. g. R_0, R_1, R_2. The indices used here are larger by one than the values of Ω in order to make them conform to the notation used for the first positive group.

For the numbering of the lines it is customary to use the rotational quantum number of the final state of the line. Whether J or K is more logical depends on whether the final state is close to case a or b. For the $^3\Sigma$-state this is certainly case b and therefore the K-values are used throughout for the first positive group in agreement with the practice of previous authors. This has the added advantage of making all the odd numbered lines the strong ones for N_2^{14}.

We depart however from the practice of some previous authors in the designation of the branches by following strictly case b notation. We call therefore a branch P, Q and R branch depending on whether $\Delta K = -1$, 0, 1. As the strict selection rule $\Delta J = 0, \pm 1$ applies to J not to K and is not even an approximate rule for K when case a is approached, there are also N, O as well as S, T branches for which $\Delta K = -3, -2$ and $+2$, and $+3$ respectively. Two indices are added which designate the spin components of the upper and lower electronic state. With this notation the 27 possible branches of a $^3\Pi \longrightarrow {}^3\Sigma$ transition are

N_{13}	O_{13}	P_{13}				
	O_{12}	P_{12}	Q_{12}			
		P_1	Q_1	R_1		
	O_{23}	P_{23}	Q_{23}			
		P_2	Q_2	R_2		
			Q_{21}	R_{21}	S_{21}	
		P_3	Q_3	R_3		
			Q_{32}	R_{32}	S_{32}	
				R_{31}	S_{31}	T_{31}

When the value of ΔJ is used to say whether a branch is a P, Q or R branch what we call the O_{13} branch is called an O type Q branch and written ${}^OQ_{13}$, O_{12} would be written ${}^OP_{12}$. The notation used here is much more natural for the first positive group and moreover avoids such awkward symbols as ${}^PR_{13}$ branch. When the two indices are equal, one one of them is left out. These branches are the so called main branches,

the only ones persisting for large values of K.

One would be tempted to use the same notation for the sake of consistency also for the second positive group. This would be feasible but contrary to all previous practice and moreover somewhat artificial as for moderate J the $^3\Pi$ levels are much closer to case a. We chose therefore J to label the rotational levels of the $^3\Pi$ states. The lowest values of J are then 0, 1, 2 for $^3\Pi_{1,2,3}$ respectively.

A $^3\Pi \longrightarrow {}^3\Pi$ transition has the following main branches

$$P_1 \ P_2 \ P_3; \ R_1 \ R_2 \ R_3; \ Q_2 \ Q_3$$

All are close doublets with one strong and one weak component. When it is necessary to distinguish the two components of a Λ-doublet a prime is added to the line which has the primed component as a final state. For the P and R branches the doubling is the difference of the Λ-doublings of the B and C states, for the Q-branches it is the sum.

There are a number of symmetry properties of the N_2 levels which are useful for classification. Levels have even or odd parity depending on whether the total wave function changes sign with an inversion at the origin or remains unchanged. The subscripts u and g indicate the same thing for the electronic wave function alone. A superscript + or - indicates the behavior with respect to reflection at a plane through the internuclear axis. It needs to be added only to Σ levels as for $\Lambda \neq 0$ the two components of the Λ-doublet always have opposite plus minus symmetry. The last and perhaps the most useful symmetry property to be considered here is that with respect to interchange of the nuclei. If the wave function apart from the nuclear spin part is symmetric we find the statistical weight of these levels twice that of the antisymmetric states. This gives rise to the well-known intensity alternations in the ratio 2:1. We may speak of strong and weak lines and may use also the expression "strong" and "weak" levels or levels with strong or weak symmetry, as there are no intercombinations between strong and weak levels.

This distinction between strong and weak levels is particularly simple as it is immediately recognizable in the empirical data. This property is related to the other symmetry properties in the following manner.

Strong levels are found for the following K values of Σ-states with an indication of the parity of these levels

Σ_g^+	K even	(even parity)
Σ_u^-	K even	(odd parity)
Σ_g^-	K odd	(odd parity)
Σ_u^+	K odd	(even parity)

Similar relations also hold for the Π level components. The most important relation to remember is that alternate rotational levels of a particular electronic state are alternately strong and weak and also have alternately odd and even parity.

4. First Positive Group of N_2 : $B^3\Pi_g \longrightarrow A^3\Sigma_u^+$

The bands of this group extend from about 5000 Å into the infrared. The first successful rotational analysis was made by Naudé (1932) who dealt with the 5-2 and 6-3 bands. Van der Ziel (1934) gave the analysis of two additional bands (12-7 and 12-8) and more recently Feast (1951) published the analysis of the 1-0 band and Carroll (1952) that of the 1-0, 2-1 and 3-2 bands. The majority of the bands of this large system therefore have never been measured and analyzed. The analysis of the bands of the first positive group is handicapped by the great complexity of the bands and the large number of blends. The existing analyses are all uncertain near the origin where the key lines are too weak with the usual discharge conditions

Naudé showed that the first positive bands are $^3\Pi \longrightarrow {^3\Sigma}$ transitions with 27 branches (see Section 3).

In this report the rotational analysis of 21 bands is presented. A few (1-0, 12-8 and parts of others) are identical with those analyzed previously. This furnishes the possibility for a comparison of our results with those of previous authors. The majority of the bands given here, however had not been analyzed before.

Table 1 presents the vibrational scheme of the first positive group with the wavelength and wavenumbers of the principal heads and the relative intensities (for details see "Explanation of table 1"). The measured

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Explanations to Table 1

This table gives the principal head, that of the P_1 branch, of the bands of the first positive group of nitrogen. This head coincides in most cases very nearly with the $P_1(1)$ line. The latter is given when the head was calculated.

The significance of the data is as follows:

1st line: λ in Å (not given beyond photographic infrared 1.2μ)
2nd line: ν in cm^{-1}. Underlined if the rotational structure of the band has been investigated
3rd line: Intensity of the band (see details below)

Letter indicates previous author of rotational analysis:

C; Carroll (1952)
F; Feast (1951)
N; Naudé (1932)
Z; van der Ziel (1934)

*signifies rotational structure given in this report

Intensity data: Numbers without brackets are measured values of Turner and Nicholls (1954) in a N_2 discharge at 1.25 mm pressure and a current of 0.9 A. Values in parentheses calculated from theoretical transition probabilities of Fraser, Jarmain (1953) and Jarmain, Nicholls (1954), and adjusted so that they are compatible with the measured values.

Table 1

Vibrational Transition in the First Positive Group of N_2

v′ \ v″	0	1	2	3	4	5	6	7	8	9	10	11	12
0	10 510.04 9 512.10 1000	8 079.28 434	6 674.05 154	5 296.68 (24)	3 947.06 (1.2)	2 625.37 (0.1)	1 331.83 (0.0)						
1	8 912.39 11 217.26 1260 FC *	10 217.53 9 784.42 [6.5]	11 931.03 8 379.21 261	7 001.84 171	5 652.22 98	4 330.53 (11)	3 036.99 (1.2)	1 771.85 (0.1)	535.23 (0.0)				
2	7 753.67 12 893.57 719 *	8 723.03 11 460.76 862 C	9 942.03 10 055.55 214	11 519.99 8 678.18 102	7 328.56 126	[illegible]006.87 81	4 713.33 (18)	3 448.19 (3.3)	2 211.57 (0.3)	1 003.92 (0.0)			
3	6 875.24 14 540.94 142 *	7 626.76 13 106.12 833	8 542.54 11 702.91 305 C	9 682.07 10 325.54 271	11 137.86 8 975.92 102	7 654.23 97	6 360.69 100	5 095.55 (17)	3 858.93 (5.2)	2 651.28 (1.0)	1 473.25 (0.1)	253.90	
4	6 166.75 16 159.10 (57) *	6 788.60 14 726.50 335 *	7 504.70 13 321.32 872 *	8 370.12 11 943.98 95	9 436.40 10 594.36 252	10 781.42 9 272.67 (79)	7 979.13 [2]	6 713.99 [4]	5 477.37 [7]	4 269.72 (1.3)	3 091.69 (0.9)	1 872.34 (0.0)	824.80
5	5 632.67 17 748.65 (9)	6 127.33 16 315.81 73	6 704.79 14 910.60 504 N	7 387.19 13 533.23 590 *	8 205.50 12 183.61 (93)	9 203.95 10 861.92 180	10 448.23 9 568.[illegible] [80]	8 303.24 [16]	7 066.62 [0]	5 858.97 [2.2]	4 680.94 (2.5)	3 461.59 (1.0)	2 414.05 (0.2)
6	5 177.52 19 308.90 (0)	5 592.53 17 876.06 13	6 069.66 16 470.85 111	6 623.57 15 093.43 548 N *	7 273.98 13 743.86 362 *	8 047.91 12 422.17 134 *	8 983.37 11 128.63 [2.6]	10 010.79 9 862.49 [44]	11 538.51 8 626.87 [23]	7 419.22 [2.4]	6 241.19 [0.2]	5 021.84 (1.0)	3 974.30 (0.7)
7	4 797.14 20 839.96	5 151.32 19 407.12	5 573.43 18 001.91 17	6 013.54 16 624.54 154	6 544.88 15 274.92 506 *	7 164.83 13 953.23 161	7 896.92 12 659.69 166 *	8 773.72 11 394.55 [4]	9 341.83 10 157.93 [18]	11 169.74 8 950.28 [21]	7 772.25 [5.6]	6 527.90 [0.2]	5 505.36 (0.2)
8		4 781.35 20 908.78	5 125.82 19 503.67	5 515.32 18 126.30 29	5 959.01 16 776.68 193	6 468.62 15 454.99 408 *	7 059.48 14 161.45 (0)	7 752.03 12 896.31 [40]	8 574.20 11 659.69 [7.9]	9 64.88 10 452.04 [1.5]	10 779.87 9 274.01 [6.1]	8 054.66 [3.1]	7 007.28 [0.5]
9			4 766.04 20 975.92	5 101.00 19 598.55 (6)	5 478.24 18 248.93 39	5 906.00 16 927.24 218	6 394.66 15 633.73 318 *	6 957.72 14 368.56 (15)	7 612.93 13 131.94 [49]	8 383.94 11 924.29 [29]	9 303.01 10 746.26 [0.0]	10 493.71 9 526.91 [6]	11 790.09 8 479.37 [7]
10				4 751.24 21 041.28	5 076.88 19 691.66 (9)	5 442.16 18 369.97 41	5 854.40 17 076.43 210 *	6 322.65 15 811.29 211 *	6 859.33 14 574.67 [39]	7 479.04 13 367.02 [18]	8 201.87 12 188.99 [28]	9 113.57 10 969.64 [3.1]	10 075.73 9 922.10 [1.2]
11					4 736.96 21 104.70	5 053.44 19 783.01 (8)	5 406.98 18 489.47 46	5 834.16 17 274.26 210 *	6 253.06 15 987.74 131 *	6 764.01 14 780.06 [45]	7 349.82 13 602.03 [4.0]	8 073.58 12 382.68 [20]	8 819.70 11 335.14 [6]
12						4 723.22 21 166.10	5 030.66 19 872.56 (12)	5 372.11 18 607.42 52 Z	5 755.19 17 370.82 170 Z *	6 185.16 16 163.20 [15] *	6 671.49 14 985.12 [34]	7 242.40 13 765.77 [0.0]	7 860.57 12 718.23 [9]

Continued in table 1a

intensities were obtained at rotational temperatures considerably higher than ours, and therefore there was considerable overlapping of neighboring bands which may have impaired the accuracy of the measurements. The calculated intensities are an indication of the general trend but cannot be relied on to give accurate values for individual bands. Our analysis is based almost exclusively on low temperature low pressure plates. Under these conditions no lines with $K > 15$ appear and neighboring bands are entirely separated in the infrared part of the spectrum and nearly so in the rest. This simplification of the spectrum reduces the chance of blends. Moreover the lines near the origin important for the interpretation of the structure appear with great intensity. For comparison we have given the 2-0 band also at a moderately high temperature with K extending to about 35.

The actual measurements and analysis are given in table 11. We believe that the way of presenting the data that we have adopted will be more useful to future workers than the commonly used way of giving the lines arranged into branches. The branches can be picked out without difficulty from our table so that we have not deemed it necessary to give a separate table with the bands arranged into branches.

The correctness of the classification can be amply tested by combination relations. These agree to within 0.01 to 0.02 cm^{-1} unless blends or otherwise unsuitable lines are involved.

All 27 branches are found well developed for small and moderate K. In most cases plates were measured on which the bands occurred with moderate intensity. In some cases measurements on several exposures were combined in order to obtain strong and weak lines at their optimum density. In general our strongest exposures were so dense everywhere that they were of little use for the elucidation of the structure.

The first positive group appears with great intensity in almost any discharge in pure N_2. In air or other mixtures containing N_2 and O_2 it is strong at low pressures but greatly weakened at pressures above 10 mm. Near atmospheric pressure it is virtually absent (see Heath, 1959).

5. 2nd Positive Group : $C^3\Pi_u \longrightarrow B^3\Pi_g$

The second positive group forms the most conspicuous feature in a N_2 or air discharge between 3000 and 5000 Å. In this wavelength region are found also the first negative bands of N_2^+ and, when oxygen is present, some NO bands. The relative intensity of the N_2^+ and N_2 bands can be varied within wide limits through proper adjustment of the discharge conditions. This is also true for the relative intensity of the first and second positive groups. A discharge in air at not too low pressure (e.g. 10 mm) will more or less surpress the first positive group without impairing the intensity of the second group. The reverse is true for the N_2 afterglow in argon in which the second positive group is very weak.

The second positive group of N_2 is one of the most extensively studied band systems. Detailed analyses of the bands of this group were given first by Hulthén and Johansson (1924, 1924a) and by Lindau (1924, 1924a). These papers dealt with the principal bands, established the essential rotational structure and the combination relations but were published at a time when the general theory of the structure of the spectra of diatomic molecules was imperfectly understood. From later analyses by Coster, Brons, v. d. Ziel (1933), Guntsch (1933) and Büttenbender and Herzberg (1935) it was known that the bands were $^3\Pi \longrightarrow {}^3\Pi$ transitions and the theoretical structure of such transitions had been firmly established. Büttenbender and Herzberg in particular studied the breaking off of the rotational sequences through predissociation in the intial state ($C^3\Pi$). It has been recognized for a long time that the lower electronic state of the 2nd positive group $B^3\Pi$ is identical with the upper state of the first positive group.

$^3\Pi \longrightarrow {}^3\Pi$ transitions have three P and three R branches, the lines of each of which are narrow doublets because of the Λ-doubling. There also should be two Q-branches which should have appreciable intensity however only for low rotational quantum numbers (for details see below). Guntsch actually identified both Q-branches in the 0-0 band and one of the Q-branches in the 0-1 and 0-2 bands. Furthermore there should be weaker branches, never observed, from transitions where the spin changes.

N withstanding the extensive previous work a careful study of the 2nd positive group reveals some new features. We have therefore photographed the second positive group under a variety of discharge conditions and measured enough bands to obtain the rotational and vibrational levels of the initial $C^3\Pi$ state at least for low and moderate J values.

Table 2 gives the vibrational transition scheme of the 2nd positive group with the wavelength of the main (P_3) edge indicated as well as estimated intensities and information about the rotational analysis of the bands.

In a discharge tube at low pressure (about 0.01 mm) cooled by liquid nitrogen neighboring bands are completely separated as the lines with $J > 15$ are surpressed. Moreover the lines are very sharp so that the Λ-doubling in the R_2 branches which has not previously been observed is fully resolved in most cases. As in the case of the first positive group the lines near the origin are strong. These were often absent from the previous analyses. The short Q_2 and Q_3 branches to be expected for a $^3\Pi \longrightarrow {}^3\Pi$ transition and observed before by Guntsch for some bands are very prominent under these conditions in all bands. The Q_2 branch is double, as it should be, with wide Λ-doubling.

If we designate by F_1, F_2, F_3 and f_1, f_2, f_3 respectively the triplet components of the $C^3\Pi$ and the $B^3\Pi$ states and add a prime, where necessary, to distinguish the two components of the Λ-doublets we obtain for

Table 2

Vibrational Scheme in 2nd Positive Group of N_2

$v' \backslash v''$	0	1	2	3	4	5	6	7	8	9	10	11
0	$\underline{3371.4}$ (10)HCG*	$\underline{3576.9}$ (10) HLg	$\underline{3804.9}$ (10) HL_2g	$\underline{4059.4}$ (8) L_2g*	$\underline{4343.6}$ (4) g	4667.3 (0)	5031.5	5452.0				
1	$\underline{3159.}$[illegible] (9) C	3338.9 (2)	$\underline{3536.7}$ (8) HL_2g	$\underline{3755.5}$ (10) HLg*	$\underline{3998.4}$ (8) Lg*	4269.7 (5)	4574.3 (2)	$\underline{4916.8}$ (0) *	5309.3 (0)			
2	$\underline{2976.8}$ (6) B	3136.0 (8)	3309 (2)	$\underline{3500.5}$ (4) C *	$\underline{3710.6}$ (8) LgB*	$\underline{3943.0}$ (8) L	4200.5 (6)	4490.2 (3)	4814.7 (1)	5179.3		
3	2819.8 (1) B	$\underline{2962.0}$ (6) B	3116.7 (6)	$\underline{3285.3}$ (3) C	3469 (0)	$\underline{3671.9}$ (6) Bg	3894.6 (7)	$\underline{4141.8}$ (5) *	4416.7 (3)	4723.5 (1)	5066.0	
4	2687	2814.3 (1) B	$\underline{2953.2}$ (6) CB	3104.0 (3)	$\underline{3268.1}$ (4) C	3446 (0)	$\underline{3641.7}$ (3) Bg	3857.9 (5)	$\underline{4094.8}$ (4) *	4355.0 (3)	4649.4 (1)	4976.4 (0)

1st line — Wave length of principal (P_2) head. Where the wave length is underlined, the rotational structure has been investigated.

2nd line —
- (3) Estimated intensity of band
- H Rotational structure given by Hulthen and Johannsen (1924)
- L Lindau (1924) L_2 Lindau (1924 a)
- C Coster, Brons, v.d. Ziel (1933)
- G Guntsch (1933); g the same but the analysis not published
- B Buttenbender ç Herzberg (1935)
- * This report, Table

the 16 main branches of a $^3\Pi \longrightarrow {}^3\Pi$ transition

$$\begin{aligned} P_i(J) &= F_i(J-1) - f_i(J) \\ P_i'(J) &= F_i'(J-1) - f_i'(J) \\ R_i(J) &= F_i(J+1) - f_i(J) \\ R_i'(J) &= F_i'(J+1) - f_i'(J) \end{aligned} \qquad i = 1, 2, 3$$

$$\begin{aligned} Q_i(J) &= F_i'(J) - f_i(J) \\ Q_i'(J) &= F_i(J) - f_i'(J) \end{aligned} \qquad i = 2, 3$$

There should, however, be additional branches when the spin changes its orientation or, in case b language, if J and K do not change by the same amount. These satellite branches must satisfy the selection rule $\Delta J = 0, \pm 1$ but not necessarily that for K.

We have, as examples, the following possibilities

$$\begin{aligned} Q_{12} &= F_1'(J) - f_2(J) \\ P_{23} &= F_2(J-1) - f_3(J) \qquad \text{etc.} \end{aligned}$$

These satellite branches cannot occur when we have either exact case a or exact case b. They must be expected to have considerably less intensity than the main branches.

There is no record that these branches have ever been observed in the past. Their lines can be exactly calculated once the energy levels have been established. Many of the satellite branches lie among the strong lines and it is not easy to find the weak lines in the vicinity of the much stronger ones.

The Q_{12}, Q_{23}, P_{12} and P_{23} branches on the other hand lie to the red of the main heads where under the low temperature conditions no lines of the main branches are found. Table 10 shows these satellit branches quite completely for the 0-0 and less so for the weaker 0-3 band. They are present also for the other bands on strongly overexposed but not measured plates.

The intensity of the satellite ranches is of the same order of magnitude as that of the Rowland ghosts c the main branches about 1/100 in the second order for our grating so t. t great care must be taken not to confuse the satellites with the ghosts. The main branches of the N^{14}-N^{15} bands should be also roughly of the same intensity (1/274 of N^{14}-N^{14}) and so that care must be taken to eliminate them also.

There seems no question however that we have here the genuine satellite branches. Some lines of those falling inside the main branches have also been identified but only sporadically as the strong lines provide too much interference.

When the gas pressure or the discharge current is raised the rotational temperature is increased and at the same time transitions from the higher vibrational levels weakened. At about 55 mm pressure rotational levels to about $J = 85$ can be observed easily for $v' = 0$, while for the other vibrational states the maximum J value is determined by predissociation. At these conditions all lines are noticeably less sharp. We have measured some bands at an intermediate condition (pressure about 1.0 mm) in order to obtain the rotational levels to about $J = 40$. It is well-known that for $v' > 4$ all rotational levels are predissociated and that therefore no bands with $v' > 4$ are found.

6. Determination of the Energy Levels

From the empirical frequencies of a band system it is in general possible through repeated applications of the combination principle to obtain the energy values of all levels involved, without recourse to any theoretical formula for the spacing of the levels, although there are one or two reservations.

If one level $F(v, J)$ is known we find empirically the differences

$$F(v, J \pm 2) - F(v, J)$$

and thus obtain successively all the levels differing by an even J from the original level. Similarly we obtain

$$F(v', J) - F(v, J)$$

directly from the measurements and obtain thus the levels for all the other values of the vibrational quantum number v.

We see that in this way we can refer the energy levels to a reference level which can be chosen arbitrarily and we can obtain all levels which combine directly or in several steps with this level.

In the tables 5-7 we have given the $J = 0$, $v = 0$ level of the F_2 component of $A^3\Sigma$ the energy zero. It is immaterial that because the F_2 component begins with $J = 1$ this is not an actual level. The lowest existing level of $A^3\Sigma$ is $J = 0$ of F_1 which is 0.72 cm^{-1} higher than the reference level.

Not all the levels of the A, B and C states can be obtained directly from the combination relations.

The procedure, outlined so far, cannot give the relative position of "weak" and "strong" levels (see p. 7). The connection between the weak and strong levels can be found with the help of a formula representing the rotational energy as function of the quantum number K (or J). It is advantageous to use for this a state where such a formula has the simplest possible structure. The F_2 component of $A^3\Sigma$ is such a state as its levels are not affected by spin interactions. After finding the relative position of one strong and one weak level all the other levels can be found within

the limits of experimental errors by combination relations, independently of any theoretical formula. The repeated application of the combination principle may however introduce cumulative accidental errors. While these do not affect the relative position of neighboring levels and therefore in general do not impair the accuracy with which the frequency of band lines can be calculated from the levels it makes the position of the higher levels above the ground state (or any other reference state) somewhat more uncertain. In order to minimize such uncertainties the following procedure was adopted.

6.1 Calculation of the $A^3\Sigma$ levels. The F_2 component of this level is independent of any spin interaction and therefore given by the simple formula

$$F_2(K) = BK(K+1) - DK^2(K+1)^2 + \ldots\ldots \quad (1)$$

where $B = B_v$ and $D = D_v$ have the usual meaning.

The differences

$$\Delta F_2(K) = F_2(K+1) - F_2(K-1) = 2B(2K+1) - D[(K+1)^2(K+2)^2 - (K-1)^2K^2]$$

can be obtained directly from the measurements

$$\Delta F_2(K) = R_2(K-1) - P_2(K+1) = Q_{12}(K-1) - O_{12}(K+1) = S_{32}(K-1) - Q_{32}(K+1) \quad (2)$$

The average of the three values obtained from one band or, if several bands with the same final vibrational state are used, the average of several bands are used for the calculations. In this and all other similar calculations, values from blends which would affect the accuracy have been excluded. Reliable values of the first 11 of these differences could be obtained for all values of v up to 9 (table 3).

Table 3.
$F_2(K+1 - F_2(K-1)$ of $A^3\Sigma$

K \ v	0	1	2	3	4	5	6	7	8	9
2	14.46	14.24	14.04	13.92	13.71	13.52	13.35	13.17	12.95	12.76
3	20.23	19.99	19.72	19.47	19.20	18.96	18.68	18.44	18.12	17.86
4	26.02	25.69	25.36	25.04	24.68	24.33	24.00	23.65	23.33	22.95
5	31.79	31.39	30.99	30.60	30.19	29.76	29.34	28.94	28.50	28.06
6	37.58	37.07	36.63	36.16	35.67	35.16	34.67	34.18	33.67	33.16
7	43.35	42.79	42.25	41.72	41.14	40.55	40.02	39.44	38.83	38.24
8	49.12	48.49	47.87	47.24	46.61	25.96	45.33	44.69	44.03	43.34
9	54.91	54.21	53.49	52.80	52.09	51.35	50.65	49.93	49.17	48.44
10	60.65	59.91	59.13	58.37	57.56	56.76	55.95	55.18	54.35	53.52
11	66.41	65.57	64.75	63.90	63.06	62.20	61.23	60.41	59.53	58.60
12	72.22	71.27	70.36	69.44	68.52	67.58	66.65	65.65	64.67	63.69
13	77.96		75.98		73.95	72.94	72.04	70.92	69.83	
14	83.71				34.83	78.38	77.16	76.13	74.97	

The fact that we are restricted to low K-values is not very favorable for obtaining an accurate value of D_v. We have therefore used for all v the value $D = 5.84.10^{-6}$ obtained by Carroll. This entails a small systematic error as D_v changes with v. The error in the energy levels because of this will be very small however probably smaller than the experimental errors. An error of 10% in D will produce only an error of .007% in B_v (about one part in 15 000). With this value for D the least square value for B_v is found from the first 11 differences $\Delta_2(K)$.

The values of the rotational energies from K = 1 to K = 13 are then calculated from (1) for each value of v. They are the smoothed out values consistent with the empirical $F_2(K+1) - F_2(K-1)$ differences. This set of rotational energies forms the foundation for all further calculations.

The F_1 and F_3 values of $A^3\Sigma$ are obtained from the triplet separations which can be obtained directly from the measurements.

$$
\begin{aligned}
F_1(K) - F_2(K) &= P_{12}(K) - P_1(K) = Q_{12}(K) - Q_1(K) \\
&= Q_2(K) - Q_{21}(K) = R_2(K) - R_{21}(K) \\
&= R_{32}(K) - R_{31}(K) = S_{32}(K) - S_{31}(K) \\
F_3(K) - F_2(K) &= O_{12}(K) - O_{13}(K) = P_{12}(K) - P_{13}(K) \\
&= P_2(K) - P_{23}(K) = Q_2(K) - Q_{23}(K) \\
&= Q_{32}(K) - Q_3(K) = R_{32}(K) - R_3(K)
\end{aligned}
$$

These triplet separations which vary only slightly with v are listed in table 4.

Knowing the $A^3\Sigma$ levels, the values of all $B^3\Pi$ levels can be obtained from the frequencies of the individual band lines. From each band every $B^3\Pi$ level (there are 6 for each J) is obtained 4 or 5 times and the average taken. This gives a good opportunity for checking the correctness of the classification. Again here obvious blends are excluded from the average.

6.2 The energies of the $B^3\Pi$ and $C^3\Pi$ levels. Up to this point all levels are relative to the $F_2(0)$ level of the final $A^3\Sigma$ state of the particular band. We want to refer all energies to one common reference level $F_2(0)$ of $A^3\Sigma$ (v = 0).

The energies of the $B^3\Pi$ levels which are obtained from the 1-0 2-0 3-0 bands are directly referred to the proper zero level. For the others we must use the vibrational differences of the $A^3\Sigma$ state which can be directly obtained from the measurements.

The simplest procedure to do this is to use the combination principle repeatedly in going from levels with known energy to levels with as yet

Table 4

Triplet separation of the $A^3\Sigma$ levels

K \ v	0	1	2	3	4	5	6	7	8
				$F_1 - F_2$					
1	.95	.92	.92	.93	.91	.91	.92	0.89	0.91
2	1.04	1.03	1.02	1.02	1.01	1.01	1.01	1.00	0.99
3	1.11	1.10	1.09	1.08	1.08	1.07	1.06	1.05	1.05
4	1.13	1.12	1.13	1.12	1.11	1.11	1.08	1.11	1.09
5	1.17	1.15	1.16	1.14	1.13	1.12	1.12	1.13	1.11
6	1.18	1.17	1.17	1.16	1.15	1.14	1.14	1.14	1.13
7	1.19	1.19	1.18	1.18	1.17	1.16	1.15	1.15	1.13
8	1.20	1.20	1.20	1.19	1.18	1.17	1.16	1.15	1.14
9	1.21	1.20	1.20	1.20	1.18	1.18	1.17	1.15	1.15
10	1.21	1.21	1.20	1.20	1.18	1.19	1.18	1.15	1.16
11	1.22	1.21	1.20	1.20	1.20	1.19	1.18	1.16	1.18
12	1.22	1.23	1.22	1.20	1.20	1.21	1.18	1.16	1.16
13	1.22		1.20	1.20	1.20	1.20	1.18	1.18	1.16
14	1.22		1.24	1.28	1.20			1.19	
15	1.23								
16	1.22								
17	1.22								
18	1.22								
19	1.22								
				$F_3 - F_2$					
1	2.66	2.67	2.64	2.60	2.60	2.55	2.55	2.52	2.54
2	1.95	1.89	1.90	1.89	1.90	1.90	1.87	1.89	1.85
3	1.72	1.72	1.72	1.68	1.67	1.68	1.66	1.65	1.63
4	1.62	1.59	1.59	1.59	1.57	1.56	1.57	1.54	1.53
5	1.56	1.54	1.53	1.54	1.52	1.51	1.50	1.49	1.49
6	1.52	1.51	1.50	1.50	1.49	1.48	1.48	1.48	1.46
7	1.50	1.49	1.48	1.48	1.46	1.45	1.45	1.45	1.43
8	1.48	1.48	1.46	1.45	1.44	1.45	1.44	1.43	1.44
9	1.47	1.46	1.46	1.45	1.44	1.42	1.42	1.41	1.41
10	1.46	1.45	1.4[illegible]	1.43	1.42	1.41	1.42	1.40	1.40
11	1.45	1.44	1.44	1.42	1.42	1.42	1.41	1.39	1.39
12	1.43	1.44	1.44	1.43	1.40	1.40	1.41	1.39	1.38
13	1.43	1.44	1.43	1.41	1.41	1.40	1.41	1.37	1.38
14	1.43		1.42					1.37	1.38
15	1.42								
16	1.42								
17	1.40								
18	1.43								
19	1.42								
20	1.42								

unknown energies. Fig. 3 shows how the various vibrational levels of the three electronic states are connected by measured bands.

For instance the v = 4 levels of $A^3\Sigma$ are obtained as follows. From first p.g. band 3-0 obtain v = 3 of B then v = 1 of C from 1-3, 2nd p.g. then v = 7 of B from 1-7 band 2nd p.g. and finally v = 4 of A from 7-4 band 1st p.g. The previously calculated rotational energies of A, v = 4, are subtracted from the rotational energies thus obtained and this gives the vibrational energy of A_4 above the v = 0 level. The fact that the values for this difference obtained from the various rotational levels agree to within a few times 0.01 cm^{-1} shows the soundness of the method and testifies to the accuracy of the measurements.

A further check is to calculate the same level using different paths e.g. B_7 via C_1 or C_2. In all cases where we have done this we found excellent agreement.

The five vibrational levels of the $C^3\Pi$ state are found in the same way with the help of bands of the second positive group. The Λ-doubling of the F_3 levels could not be obtained. The unresolved doublets yield one value for F_3 which is closest to the strong component and entered in table 7 as such.

All $B^3\Pi$ levels have been obtained from bands of the first positive group because many of these levels as lower states of the 2nd positive group are involved with unresolved doublets which lowers the accuracy. An exception is the v = 0 level of B which was found from the 0-0 2nd p.g. band as all first p.g. bands involving this level lie in an inconvenient region.

The repeated use of the combination principle increases, of course, the chance for piling up errors of measurements. This is minimized by our calculating the vibrational levels $F_2(0)$ of the $A^3\Sigma$ state from many differences and taking the average. The standard deviation of this average is of the order of magnitude 0.001 cm^{-1} in many cases*. The smoothed out calculated rotational energies are then added in each case to the vibrational levels so that the effect of accidental errors is reduced to a minimum.

Tables 5-7 give the energy levels thus calculated for all A states to v = 9, B states to v = 12 and C states to v = 4. They are as free from systematic errors as can be obtained with our present set of measurements and the accidental errors in general should not exceed a few times 0.01 cm^{-1}.

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*This does not mean that the energy levels are known with this accuracy as systematic errors in the measurement are not taken care of by this (or any other) procedure.

Table 5

Rotational and Vibrational Structure of the $A^3\Sigma$ state

K	F_2	F_1	F_3	F_2	F_1	F_3	F_2	F_1	F_3
	v = 0			v = 1			v = 2		
0	0*	.72	-	1432.91*	33.63	-	2838.15*	38.87	-
1	2.89	3.84	5.55	435.76	36.68	38.43	840.97	41.89	43.61
2	8.67	9.71	10.64	441.47	42.49	43.36	846.60	47.62	48.49
3	17.35	18.46	19.07	450.03	51.13	51.75	855.05	56.14	56.77
4	28.91	30.04	30.51	461.45	62.57	63.05	866.33	67.45	67.92
5	43.37	44.54	44.93	475.72	76.87	77.27	880.41	81.57	81.94
6	60.71	61.89	62.23	492.84	94.01	94.35	897.31	98.48	98.81
7	80.94	82.13	82.43	512.81	13.99	14.30	917.03	18.21	18.51
8	104.06	05.26	05.54	535.63	36.82	37.11	939.56	40.75	41.02
9	130.07	31.28	31.53	561.31	62.51	62.77	964.90	66.09	66.36
10	158.96	60.16	60.42	589.82	91.03	91.27	993.05	94.25	94.49
11	190.73	91.95	92.17	621.19	22.40	22.64	3024.02	25.21	25.46
12	225.39	26.62	26.81	655.40	56.62	56.84	057.79	59.01	59.23
13	262.92	64.15	64.39	692.48	93.68	93.90	094.37	95.59	95.80
14	303.34	04.57	04.77	732.35	33.60	33.82			
15	346.63	47.88	48.10						
16	392.82	94.05	94.22						
17	441.85	43.10	43.31						
18	493.79	95.01	95.17						
19	548.55	49.82	49.99						
20	606.22	07.44	07.60						
21	666.71	67.98	68.16						
	v = 3			v = 4			v = 5		
0	4215.57*	16.29	-	5565.23*	65.95	-	6886.95*	87.67	-
1	218.35	19.26	20.95	567.97	68.88	70.57	889.66	90.57	92.21
2	223.91	24.92	25.81	573.46	74.47	75.36	895.07	96.08	96.97
3	232.26	33.34	33.93	581.69	82.77	83.36	903.18	04.25	04.86
4	243.38	44.49	44.96	592.67	93.78	94.25	914.01	15.12	15.57
5	257.29	58.42	58.81	606.39	07.52	07.91	927.53	28.65	29.04
6	273.97	75.12	75.45	622.84	23.99	24.32	943.76	44.90	45.24
7	293.43	94.60	94.89	642.05	43.22	43.51	962.69	63.85	64.14
8	315.67	16.85	17.11	663.99	65.17	65.43	984.33	85.50	85.78
9	340.69	41.87	42.13	688.66	89.84	90.10	7008.66	09.84	10.08
10	368.48	69.67	69.90	716.08	17.27	17.50	035.69	36.88	37.10
11	399.04	00.24	00.46	746.23	47.43	47.65	065.43	66.62	66.85
12	432.38	33.58	33.79	779.12	80.32	80.53	097.85	99.06	99.25
13	468.49	69.69	69.90	814.74	15.94	16.15	132.98	34.18	34.38

*Calculated, not an actual level

Add 49 755.90 to obtain the position above the ground level $X^1\Sigma$ of the molecule

Table 5 (ctd.)

K	F_2 (v = 6)	F_1 (v = 6)	F_3 (v = 6)	F_2 (v = 7)	F_1 (v = 7)	F_3 (v = 7)	F_2 (v = 8)	F_1 (v = 8)	F_3 (v = 8)
0	8180.52*	81.23	-	9445.73*	46.44	-	10 682.37*	83.07	-
1	183.19	84.11	85.74	448.36	49.25	50.88	684.95	85.87	87.50
2	188.52	89.53	90.39	453.62	54.62	55.51	690.14	91.13	91.99
3	196.53	97.59	98.19	461.51	62.56	63.16	697.91	98.96	99.54
4	207.19	08.27	08.76	472.03	73.14	73.57	708.28	09.37	09.81
5	220.53	21.65	22.03	485.18	86.31	86.67	721.23	22.34	22.72
6	236.53	37.67	38.01	500.96	02.10	02.44	736.77	37.90	38.23
7	255.20	56.35	56.65	519.36	20.51	20.81	754.89	56.02	56.32
8	276.52	77.68	77.96	540.39	41.54	41.82	775.61	76.75	77.05
9	300.52	01.69	01.94	564.05	65.20	65.46	798.91	00.06	00.32
10	327.17	28.35	28.59	590.33	91.48	91.73	824.79	25.95	26.19
11	356.48	57.66	57.89	619.23	20.39	20.62	853.26	54.44	54.65
12	388.45	89.63	89.86	650.76	51.93	52.15	884.31	85.47	85.69
13	423.08	24.26	24.49	684.90	86.06	86.27	917.94	19.10	19.32

K	F_2 (v = 9)	F_1 (v = 9)	F_3 (v = 9)
0	11 890.06*	90.76	-
1	892.61	93.53	95.16
2	897.71	98.70	99.56
3	905.37	06.42	07.00
4	915.57	16.66	17.10
5	928.32	29.43	29.81
6	943.63	44.76	45.09
7	961.48	62.61	62.91
8	981.87	83.01	83.31
9	004.82	05.97	06.23
10	12 030.31	31.47	31.71
11	058.34	59.52	59.73
12	088.91	90.07	90.29
13	122.03	23.19	23.41

For low K-values, the levels have been underlined which give rise to strong lines

Table 6

Rotational and Vibrational Structure of the $B^3\Pi$ state

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 0						v = 1					
0	9 510.67	513.00	-	-	-	-	11 215.82	218.15	-	-	-	-
1	513.69	515.94	557.52	557.52	-	-	218.80	221.10	263.04	263.04	-	-
2	519.71	521.95	564.34	564.45	600.16	600.16	224.78	227.04	269.36	269.38	305.16	305.16
3	[illegible]	530.99	573.97	574.08	610.78	610.79	233.74	235.98	278.83	278.73	315.67	315.68
4	540.85	543.03	586.92	587.13	624.95	624.95	245.73	247.89	291.53	291.66	329.67	329.66
5	556.02	558.14	602.86	603.01	642.62	642.63	260.70	262.84	307.41	307.60	347.10	347.13
6	574.21	576.28	622.19	622.43	663.74	663.75	278.73	280.77	326.49	326.74	367.97	367.98
7	595.52	597.48	644.82	644.96	688.27	688.29	299.79	201.77	348.78	349.10	392.23	392.25
8	619.88	621.79	670.44	670.85	716.22	716.25	323.89	225.82	374.30	374.68	419.86	319.89
9	647.37	649.23	699.58	699.98	747.65	747.70	351.08	252.93	403.03	403.48	450.84	450.92
10	677.96	679.81	731.88	632.38	782.31	782.36	381.35	283.12	435.00	435.50	485.17	485.22
11	711.69	713.44	767.47	768.04	820.42	820.49	414.69	216.41	470.20	470.75	522.82	522.88
12	748.55	750.25	806.31		861.88		451.18	252.81	508.64	509.23	563.74	563.82
13	788.63	790.19	848.42	849.12		906.68						
14	831.71	833.29	893.79		954.70							
15	878.14	870.57		943.31		006.11						
	v = 2						v = 3					
0	12 892.16	894.49	-	-	-	-	14 539.60	541.94	-	-	-	-
1	895.13	897.44	939.32	939.30	-	-	542.52	544.80	586.64	586.64	-	-
2	901.04	903.29	945.54	945.58	981.36	981.36	548.37	550.63	592.83	592.87	628.63	628.64
3	909.90	912.13	954.93	955.02	991.73	991.75	557.14	559.38	602.08	602.19	638.89	638.88
4	921.76	923.92	967.47	967.60	905.56	905.56	568.87	571.03	614.50	614.61	652.54	652.53
5	936.58	938.71	983.17	983.36	922.77	922.79	583.53	585.65	630.01	630.20	669.55	669.57
6	954.40	956.46	002.05	002.28	043.40	043.40	601.16	603.21	648.67	648.90	689.92	689.91
7	975.24	977.23	024.09	024.39	067.37	067.39	621.76	623.76	670.46	670.75	713.60	713.60
8	999.09	001.02	049.31	049.67	094.67	094.70	645.35	647.27	695.39	695.74	740.53	740.58
9	13 025.97	027.83	077.72	078.15	125.31	125.33	671.94	673.79	723.48	723.90	770.81	770.86

Table 6

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 2 (ctd.)						v = 3 (ctd.)					
10	13 055.91	057.70	109.33	109.81	159.22	159.28	14 701.53	703.33	754.71	755.19	804.30	804.36
11	088.88	090.61	144.13	144.66	196.40	196.48	734.16	735.88	789.10	789.64	841.10	841.13
12	124.94	126.62	182.11	182.70	236.88	236.96	769.78	771.47	826.64	827.23	881.07	881.15
13	164.09	165.68	223.28	223.91	280.61	280.70	808.52	810.09	867.31	867.94	924.25	924.34
14	206.31	207.87	267.63	268.32	327.59	327.66	850.20	851.78	911.15	911.85	970.69	
15	251.63	253.11	315.18	315.91	377.75	377.91	895.09	896.53	958.17	958.90		020.35
16	300.07	301.49	365.91	366.66	431.19	431.31	942.85	944.35	008.25	009.00	073.07	
17	351.57	352.97	419.82	420.60	487.81	487.99	993.88	995.21	061.56	062.35		129.10
18	406.23	407.57	476.88	477.70	547.66	547.79	047.76	049.21	117.92	118.75	118.16	
19	463.98	465.29	537.15	537.99	610.66	610.90	104.96	106.21	177.53	178.58		250.52
20	524.87	526.09	600.55	601.42	676.93	677.11	164.98	166.39	240.15	241.02	315.87	
21	588.83	590.08	667.13	668.02		746.61	228.34	229.54	305.99	306.88		384.54
22	656.01	656.96	736.87								456.17	
	v = 4						v = 5					
0	16 158.04	160.30	-	-	-	-	17 747.35	749.62	-	-	-	-
1	160.91	163.24	204.95	204.93	-	-	750.22	752.49	794.16	794.16	-	-
2	166.72	168.99	211.07	211.09	246.88	246.88	755.93	758.19	800.20	800.25	-	-
3	175.39	177.62	220.24	220.33	257.02	257.03	764.51	766.73	809.28	809.35	836.02	836.02
4	186.99	189.15	232.52	232.63	270.49	270.50	775.98	778.13	821.40	821.51	346.02	846.02
5	201.49	203.61	247.85	248.03	287.29	287.28	790.32	792.43	836.55	836.73	859.34	859.32
6	218.92	220.97	266.29	266.52	307.39	307.40	807.56	809.60	854.78	855.01	875.93	875.92
7	239.29	241.28	287.81	288.11	330.80	330.82	827.69	829.68	876.05	876.35	895.76	895.77
8	262.61	264.52	312.46	312.79	357.42	357.44	850.76	852.67	900.42	900.76	918.85	918.87
9	288.87	290.75	340.20	340.62	387.32	387.35	876.76	878.60	927.85	928.25	945.17	945.20
10	318.14	319.93	371.08	371.52	420.42	420.46	905.67	907.46	958.36	958.81	974.69	974.71
11	350.38	352.11	405.07	405.56	456.75	456.80	937.54	939.27	991.93	992.41	007.40	007.43
12	385.61	387.29	442.13	442.71	496.23	496.33	972.38	974.05	028.59	029.15	043.27	043.31
13	423.87	425.51	482.41	483.09	538.99	538.99	18 010.21	011.80	068.34	068.93	082.28	082.36
14	465.16	466.72	525.63	426.40	584.83	584.83	050.97		111.10		124.46	124.52

Table 6 (ctd.)

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 4						v = 5					
15	16 509.40	510.95	572.09	572.95	633.87	633.87						
16	556.75	558.24	621.61	622.5[illegible]		686.01						
17	607.06	608.52	674.17	675.20	741.32							
18	660.49	661.89	730.01	731.04		799.71						
19	716.86	718.30	788.71	789.90	861.31							
20	776.38	777.70	850.65	851.84		925.91						
21	838.81	840.19	915.61	916.94	993.75							
22	904.44	905.70				064.55						
23	972.93	974.28			138.57							
24	044.64	045.85				215.56						
	v = 6						v = 7					
0	19 307.63	309.88	-	-	-	-	20 838.73	841.01	-	-	-	-
1	310.48	312.[illegible]	354.38	354.34	-	-	841.53	843.80	885.30	885.32	-	-
2	316.11	318.37	360.29	360.[illegible]	396.10	396.10	847.12	849.32	891.19	891.24	926.97	926.98
3	324.60	326.80	369.26	369.35	405.97	405.96	855.49	857.70	900.05	900.13	936.72	936.71
4	335.94	338.10	381.24	381.35	419.07	419.10	866.69	868.86	911.88	912.00	949.67	949.65
5	350.10	352.22	396.21	396.39	435.48	435.49	880.69	882.82	926.67	926.86	965.82	965.83
6	367.15	369.20	414.22	414.44	455.07	455.07	897.54	899.59	944.46	944.66	985.18	985.16
7	387.05	389.03	435.24	435.52	477.86	477.89	917.19	919.18	965.22	965.51	007.64	007.69
8	409.84	411.76	459.30	459.63	503.84	503.87	939.71	941.61	988.97	989.30	033.29	033.[illegible]
9	435.51	437.38	486.38	486.78	532.98	533.01	965.09	966.95	015.73	016.11	062.04	062.09
10	464.09	465.89	516.50	516.97	565.27	565.30	993.32	995.12	045.47	045.92	093.93	093.96
11	495.59	497.33	549.68	550.19	600.67	600.73	21 024.43	026.17	078.31	078.71	128.86	128.92
12	530.04	531.69	585.88	586.27		639.27	058.44	060.11	114.00	114.53	166.88	166.98
13		568.99	525.12	525.75		680.92	095.35	096.96				208.09
14							135.14	137.70				
15								179.36				

Table 6 (ctd.)

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 8						v = 9					
0	22 340.52	342.79	-	-	-	-	23 812.85	815.10	-	-	-	-
1	343.28	345.56	386.98	387.00	-	-	815.58	817.81	859.16	859.20	-	-
	348.79	351.01	392.80	392.83	428.55	428.55	821.02	823.27	864.92	864.94	900.64	900.66
3	357.08	359.28	401.52	401.60	438.12	438.14	829.20	831.42	873.56	873.62	910.11	910.11
4	368.12	370.30	413.20	413.31	450.90	450.92	840.12	842.27	885.06	885.18	922.71	922.71
5	381.96	384.07	427.79	427.98	466.85	466.84	853.79	855.89	899.50	899.64	938.42	938.43
6	398.58	400.65	445.34	445.56	485.92	485.94	870.21	872.25	916.81	917.02	957.24	957.24
7	418.01	419.99	465.84	466.12	508.10	508.12	889.39	891.37	937.04	937.31	979.12	979.14
8	440.25	442.17	489.28	489.62	533.40	533.42	911.35	913.28	960.18	960.51	004.09	004.07
9	465.30	467.16	515.71	516.09	561.78	561.80	936.08	937.96	986.25	986.63	032.06	032.08
10	493.18	494.98	545.07	545.50	593.21	593.25	963.62	965.42	015.23	015.67	063.08	063.11
11	523.92	525.65	577.40	577.88	627.69	627.77	993.96	995.70	047.13	047.63	097.11	097.14
12	557.50	559.20	612.59	613.22	665.22	665.27	24 027.11	028.79	081.96	082.50	134.13	134.18
13	593.94	595.54	650.98	651.52	705.79	705.86	063.04	064.70	119.84	120.30	174.08	174.21
14	633.27		692.16				101.87	103.59	160.53		217.11	
	v = 10						v = 11					
0	25 255.61	257.86	-	-	-	-	26 668.69	670.90	-	-	-	-
1	258.30	260.54	301.81	301.77	-	-	671.31	673.58	714.68	714.73	-	-
2	263.67	265.90	307.45	307.50	343.15	343.16	676.66	678.88	720.30	720.36	755.95	755.93
3	271.75	273.96	315.97	316.06	352.49	352.49	684.64	686.85	728.70	728.78	765.14	765.15
4	282.54	284.73	327.35	327.48	364.91	364.93	695.28	697.44	739.92	740.04	777.37	777.40
5	296.05	298.16	341.61	347.75	380.41	380.42	708.62	710.71	753.98	754.11	792.66	792.67
6	312.27	314.32	358.70	358.89	398.98	398.99	724.61	726.65	770.83	771.03	810.96	810.98
7	331.21	333.21	378.66	378.93	420.57	420.58	743.28	745.28	790.55	790.78	832.22	832.23
8	352.90	354.85	401.51	401.82	445.18	445.22	764.69	766.63	813.06	813.38	856.48	856.49
9	377.33	379.18	427.23	427.60	472.80	472.82	788.80	790.66	838.43	838.80	883.70	883.72

Table 6 (ctd.)

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 10						v = 11					
10	25 404.51	406.31	455.84	456.27	503.38	503.42	26 815.63	817.43	866.66	867.08	913.85	913.93
11	434.47	436.21	487.34	487.80	536.95	537.00	845.17	846.94	897.71	898.17	946.96	946.99
12	467.20	468.90	521.72	522.24	573.53	573.56	877.47	879.15	931.59	932.10	982.96	983.01
13	502.69	504.34	558.97	559.52		612.99	912.49	914.14	968.27	968.90	021.92	021.96
14	541.03		599.11				950.27		007.93	008.54		
	v = 12											
0	28 051.84	054.18	-	-	-	-						
1	054.51	056.67	097.72	097.73	-	-						
2	059.69	061.92	103.22	103.25	138.79	138.81						
3	067.58	069.78	111.50	111.58	147.86	147.86						
4	078.09	080.21	122.58	122.68	159.91	159.95						
5	091.23	093.34	136.45	136.59	174.95	174.97						
6	107.01	109.06	153.06	153.27	192.98	193.01						
7	125.46	127.45	172.50	172.73	213.96	213.99						
8	146.56	148.48	194.69	195.00	237.86	237.93						
9	170.34	172.19	219.71	220.07	264.69	264.73						
10	196.80	198.65	247.53	247.93	294.42	294.45						
11	225.97	227.70	278.18	278.62	327.04	227.07						
12	257.82	259.51	311.58	312.08	362.52	362.58						
13	292.37	293.99	347.78	348.39	400.89	400.97						
14		331.20	386.76									
15		371.17										

For low K-values, the levels have been underlined which give rise to strong lines.

Table 7

Rotational and Vibrational Structure of the $C^3\Pi$ state

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 0						v = 1					
0	39 185.34	187.62	-	-	-	-	41 180.29	182.93	-	-	-	-
1	188.66	190.80	229.17	229.17	-	-	183.62	186.23	223.47	223.47	-	-
2	195.31	197.45	236.27	236.27		269.24	190.18	192.65	230.47	230.53		262.69
3	205.25	207.35	246.92	247.03	281.28		199.97	202.06	241.04	241.10	274.89	
4	218.50	220.55	261.15	266.37		297.30	213.10	215.11	255.08	255.26		290.72
5	235.15	237.11	279.03	279.31	317.23		229.53	231.46	272.77	273.03	310.42	
6	255.18	257.06	300.52	300.89		341.07	249.31	251.17	294.00	294.35		333.93
7	278.61	280.43	325.68	326.10	368.66		272.46	274.24	318.85	319.28	361.29	
8	305.50	307.21	354.45	354.93		400.13	299.01	300.70	347.40	348.00		392.34
9	335.81	337.46	386.86	387.41	435.27		328.97	330.61	379.32	379.87	427.10	
10	369.64	371.19	422.94	423.55		474.32	362.40	363.93	414.98	415.58		465.65
11	406.93	408.44	462.65	463.32	516.93		399.24	400.72	454.22	454.86	507.78	
12	447.76	449.18	506.00	506.73		563.42	439.57	440.98	497.07	497.75		553.67
13	492.07	493.47	553.00	553.79	613.47		483.37	484.73	543.46	544.23	603.00	
14	540.02	541.28	603.57	604.42		667.30	530.69	532.00	593.55	594.43		656.46
15	591.34	592.64	657.84	658.71	724.65		581.51	582.77	647.04	648.00	713.15	
16	646.41	647.55	715.79	716.66		785.85	635.78	637.02	704.25	705.28		773.57
	v = 2						v = 3					
0	43 121.84	124.17	-	-	-	-	44 997.13	999.24	-	-	-	-
1	125.15	127.24	164.14	164.14	-	-	45 000.27	002.36	038.03	038.08	-	-
2	131.58	133.65	171.08	171.14		202.91	006.60	008.66	044.82	044.90		075.73
3	141.29	143.35	181.58	181.56	214.66		016.11	018.12	055.08	055.21	087.30	
4	154.22	156.20	195.41	195.54		230.29	028.79	030.75	068.78	068.95		102.70

Table 7

J	F_1'	F_1	F_2	F_2'	F_3'	F_3	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 2						v = 3					
5	43 170.40	172.31	212.81	213.09	249.72		45 044.73	046.60	085.89	086.16	121.84	
6	189.92	191.76	233.77	234.11		272.95	063.89	065.69	106.51	106.87		144.71
7	212.76	214.50	258.26	258.68	299.92		086.34	088.02	130.64	131.01	171.22	
8	238.91	240.62	286.30	286.81		330.57	112.07	113.66	158.24	158.72		201.42
9	268.56	270.02	317.96	318.45	364.91		141.13	142.65	189.32	189.84	235.16	
10	301.42	302.94	353.03	353.68		402.98	173.50	174.98	223.92	224.50		272.59
11	337.77	339.20	392.79		444.56		209.26	210.66	261.96	262.63	313.49	
12	377.55	378.92							303.63	304.26		

J	F_1'	F_1	F_2	F_2'	F_3'	F_3
	v = 4					
0	46 780.22	782.23	-	-	-	-
1	783.30	785.28	819.16	819.16	-	-
2	789.47	791.40	825.84	825.86		855.06
3	798.71	800.58	835.80	835.90	866.43	
4	811.10	812.90	849.13	849.32		881.48
5	826.48	828.35	865.88	866.40	900.21	
6	845.30	846.95	886.16	886.48		92[illegible].58
7	867.20	868.76	909.55	909.95	948.53	
8	892.30	893.75	936.49	936.97		978.07
9	920.64	922.05	966.92	967.41	011.05	

J	F_1'	F_1	F_2	F_2'	F_3' F_3
	v = 4 (c'td)				
10	46 952.21	953.54	000.68	001.26	047.66
11	987.05	988.42	037.88	038.50	087.62
12			078.45	079.11	131.07
13			122.50	123.17	178.03
14			169.89	170.57	

For low K-values, the levels have been underlined which give rise to strong lines

(These errors might be slightly larger for the C levels because of frequent occurrence of unresolved Λ-doublets in the second positive group.)

The levels thus obtained reach to about J = 13 and these are the ones of importance in upper air phenomena. To obtain the levels for higher J the same procedure in general cannot be used because of the fading out of the satellite branches and also expression (1) for the rotational energy will not remain a sufficiently good approximation with the adopted values of B_v and D_v. Wherever higher values are given they were obtained through direct application of the combination principle usually with rotational differences from the main branches only. As the cumulative errors for the three triplet components are independent of each other, one cannot expect to find the triplet separations for high J with the accuracy of the wave number measurements. This is also true for the Λ-doubling of the C levels as they must be obtained from the 2nd positive group which has no Q branches for large J.

For the B levels the situation is more favorable. We have

$$\begin{aligned} \Delta_1(J) &= R_1(J) - Q_1(J) &&= F_1(J+1) - F_1'(J) \\ \Delta_1'(J) &= Q_1(J+1) - P_1(J+1) &&= F_1'(J+1) - F_1(J) \\ \Delta_1 - \Delta_1' &= F_1(J+1) - F_1'(J+1) + [F_1(J) - F_1'(J)] && \end{aligned} \tag{3}$$

in other words we obtain the sum of the Λ-doublings of two successive levels. Similar expressions hold for the F_2 and F_3 components.

If the Λ-doubling is a slowly varying function of J, as it actually is, the variation can be considered linear for neighboring J and we obtain

$$\Delta_1(J) - \Delta_1(J') = 2[F_1(J+\tfrac{1}{2}) - F_1'(J+\tfrac{1}{2})] \tag{4}$$

This makes it possible to determine the Λ-doubling for the B states as function of J with any desired accuracy (see Fig. 4).

The energy levels of tables 5-7 make it possible to calculate to within a few times 0.01 cm^{-1} the lines of all the other bands in the two systems, the rotational structure of which is not given in this report.

The possibility of doing this makes it possible to disentangle two bands which virtually fall on top of each other as e.g. the 4-0 and 12-9 bands of the first positive group. This fact has made it unnecessary for us to analyze the remaining bands of the two systems as this would not furnish any new information.

<u>6.3 Determination of the absolute energies.</u> All energies in tables 5-7 are given with respect to the $F_2(0)$ level of $A^3\Sigma(v=0)$ which has been taken arbitrarily as zero. For many purposes it would be advantageous to know the absolute values of the energy, i.e. the energy above the ground state of the molecule $X^1\Sigma(v=0, J=0)$.

Any band which connects the known triplet bands with the ground state will be suitable for this. The only known bands achieving this are

the Vegard-Kaplan bands $A^3\Sigma \longrightarrow X^1\Sigma$. Measurements of the rotational structure of the 6-0 and 7-0 bands of this sytem in absorption have been given by Wilkinson (1959). The procedure is as follows.

1. Obtain the rotational energy levels of the ground state $X^1\Sigma$ (v=0) from the best values of the rotational constants which are those obtained from Raman measurements of Stoicheff (1954).

2. With the known rotational levels of the ground state calculate from the observed lines of the 6-0 and 7-0 Vegard-Kaplan bands the rotational levels of the A_6 and A_7 states. The accuracy of these values is not as good as that obtained from the visible bands as the accuracy of the individual measurements is less and the R- and P- branches are superimposed on each other in both bands.

3. Compare the rotational levels thus obtained with the values in table 5. The average difference is 49 755.90 cm^{-1} with a possible error of one cm^{-1}. This amount should be added to the values in tables 5-7 in order to convert them into absolute energies.

Table 8 gives the absolute energy levels of the lowest rotational level of each vibrational state, together with data about dissociation and ionization taken from Mulliken (1957).

Table 8

Lowest Rotational Level of Each State Above $X^1\Sigma$

v	$A^3\Sigma$	$B^3\Pi$	$C^3\Pi$	
0	49 756.62	59 266.22	88 941.24	
1	51 189.53	60 971.72	90 936.19	
2	52 594.77	62 648.06	92 877.77	
3	53 972.19	64 295.50	94 753.03	
4	55 321.85	65 913.94	96 536.12	
5	56 643.57	67 503.25	Dissociation	
6	57 937.13	69 063.53		
7	59 202.34	70 594.63	$^4S + {}^4S$	78 692
8	60 438.97	72 096.42	$^4S + {}^2D$	97 915
9	61 646.66	73 568.75	$^2D + {}^2D$	117 138
10	62 824.73	75 011.51	Ionization	125 672
11	63 973.12	76 424.59	I + exc. of $^2\Sigma_u^+$	151 338
12	65 091.70	77 807.74		
13	66 257.85	79 161.01*		
14		80 485.08		
15		81 776.63		
16		83 037.05		
17		84 266.28		

*interpolated

7. Molecular Constants

The rotational and vibrational constant of the three electronic levels have been determined previously (Carroll, 1952; Budó, 1935; Hebb, 1936; Guntsch, 1934; Coster, etc. 1933). Because we have more complete and in some cases more accurate data a redetermination may be useful.

7.1 $A^3\Sigma$. The determination of the B_v values with the help of the F_2 levels has been treated in section 6. The so determined B_v values are listed in the appropriate column of table 9.

According to Kramers (1929) the triplet separation of a $^3\Sigma$ level is (see also Hebb, 1936)

$$\Delta_{12} = 6e\frac{K+1}{2K+3} - c(K+1) \tag{3a}$$

$$\Delta_{32} = 6e\frac{K}{2K-1} + cK \tag{3b}$$

with e and c two constants. From this it follows that

$$\Delta_{12}(K) + \Delta_{32}(K+1) = \frac{(K+1)^2}{(K+1)^2 - \frac{1}{4}} \cdot 6e \tag{4}$$

which can be used for calculating the constant e. The values found from the first six pairs of separations are entered in table 9. They decrease slightly with v. (4) represent the differences within the limits of experimental errors which means that the part depending on e in (3a) and (3b) agrees with the experimental facts and that the second part can be written at least $\gamma f(K+1)$ and $\gamma f(K)$ respectively. However another relation to isolate the constant c

$$(K+1)\Delta_{32}(K+2) - (K+2)\Delta_{12}(K) = 2c(K+1)(K+2) \tag{5}$$

is not even approximately satisfied.

We may thus say that Kramers' formula reproduces well the general features of the triplet separation but cannot be trusted in all details. This is undoubtedly due to the neglect of some interactions.

7.2 Constants of the $B^3\Pi$ and $C^3\Pi$ levels. We are dealing here with rotational states which are intermediate between cases a and b. It is necessary not only to take into account the decoupling of the spin from the internuclear axis through the influence of the rotation, but also the Λ-doubling which is the incipient decoupling of the orbital angular momentum.

This problem has been dealt with in principle by Hill and Van Vleck (1928) and Van Vleck (1929). The rotational energies are complicated functions of the angular momentum J. Budó (1935) and Hebb (1936) have worked out details for $^3\Pi$ states, Budó without taking the Λ-doubling into

Table 9

Rotational and Vibrational Constants

v	$A^3\Sigma$ B_v	$A^3\Sigma$ e_v	$B^3\Pi$ B_v	$C^3\Pi$ B_v
0	1.4457	0.447	1.62849*	1.8149
1	1.4271	0.441	1.61047	1.7933
2	1.4089	0.440	1.59218	1.7694
3	1.3907	0.438	1.57365	1.7404
4	1.3720	0.434	1.55509	1.6999
5	1.3529	0.433	1.53676	
6	1.3338	0.431	1.51787	
7	1.3152	0.430	1.49896	
8	1.2954	0.426	1.47940	
9	1.2756*		1.46016	
10			1.44124	
11			1.42132	
12			1.40150	

	$A^3\Sigma$	$B^3\Pi$	$C^3\Pi$
B_e	1.4545_1	1.63748	1.8247
α	0.01798	0.01794	0.01868
β	$-8.44 \cdot 10^{-5}$	$-7.38 \cdot 10^{-5}$	$-2.28 \cdot 10^{-3}$
γ			$7.33 \cdot 10^{-4}$
δ			$-1.5 \cdot 10^{-4}$
ω	1460.60	1735.42	2047.09
x	13.851	15.198	28.446
y	0.00625	0.178	2.085
z	0.00172	0.0158	0.535

Rotation $B_v = B_e - \alpha(v+\frac{1}{2}) + \beta(v+\frac{1}{2})^2 + \gamma(v+\frac{1}{2})^3 + \delta(v+\frac{1}{2})^4$

Vibration $E_v = \omega(v+\frac{1}{2}) - x(v+\frac{1}{2})^2 + y(v+\frac{1}{2})^3 - z(v+\frac{1}{2})^4$

The vibrational constants were calculated from the first eight differences for A, from the first four for B and C.

*extrapolated

consideration, Hebb treating the more general case, and these authors have applied the results to the N_2 levels.

In order to calculate B_v one can make use of the fact that for $J > 2$ the sum of the 6 states belonging to one value of J is independent of the interactions and equal to

$$\text{const.} + [6J(J+1) - 2]B_v$$

The effect of the rotational distortion expressed approximately by the term $-6D_vK^2(K+1)^2$ is not very significant for moderate values of J and can be taken care of by an approximate value as was done for the $A^3\Sigma$ constant. The values of B_v so calculated are listed in table 9. They are in good agreement with the values of previous investigators.

While these values of B_v should be independent of the particular type of interaction and therefore quite reliable, this cannot be said of other features of the individual levels. Here the exact values of the energies do depend on the particular form of interaction. The theoretical formulas present a fair approximation but are not exact (for details see Budó and Hebb).

Some of the properties can more easily be represented graphically from the empirical data than by the rather complicated theoretical formulae. Fig. 4 represents the Λ-doubling for the $B^3\Pi$ level obtained for the higher values of J in the manner set forth on p. 28. Fig. 5 shows the rotational levels after the quantity $BJ(J+1)$ has been subtracted from them. Without any interactions (strict case a) we would have three horizontal lines. We see that F_2 never departs very much from this horizontal line. The asymptotic values for both case a and case b are represented by $BJ(J+1)$. The slight depression for higher J is mainly due to the term $-DJ^2(J+1)^2$ representing the centrifugal distortion of the molecule.

For F_1 and F_3 the asymptotic values are represented by $BJ(J-1)$ and $B(J+1)(J+2)$. When $BJ(J+1)$ is subtracted from this we obtain $-2BJ$ and $+2B(J+1)$ respectively. These asymptotic values are shown by the broken lines in Fig. 5 and we see that the actual curves run parallel to these beginning with moderate values of J.

8. Predissociation and the High Vibrational Levels of $B^3\Pi$

Van der Ziel (1934) has found that for $v = 12$ predissociation occurs in the $B^3\Pi$ state for $J > 33$. He concluded this from a weakening of the lines for these J values. It is difficult to conclude from his data whether this falling off in intensity is actually due to predissociation or at least partly to the normal falling off of the intensity for the particular rotational temperature. The issues that were at stake at that time were whether the dissociation was into a ^4S plus a ^4D atom as van der Ziel believed or into $^4S+^4S$ have now been resolved from other evidence in favor of the second possibility. In view of our present knowledge it is interesting to examine the behavior of the $B^3\Pi$ state for high vibrational quantum numbers.

The dissociation energy of N_2 into two normal molecules* ($^4S+^4S$) is 9.756 eV or 78 692 cm^{-1}. This is, as table 8 shows between B_{12} and B_{13}, 884 cm^{-1} above the lowest rotational state of B_{12}. This amounts to J = 24 of the F_2 states whereas van der Ziel believed to have observed predissociation at J = 33. At J = 33 the energy of the F_2 state is about 730 cm^{-1} above the dissociation limit.

There is ample evidence in other cases that the visible signs of predissociation do not necessarily start at the dissociation limit, and this may be the case here. Our own observations do not reach sufficiently high J values to check this point. Taken at face value the observed predissociation limit would raise the dissociation energy by about 730 cm^{-1} or about 0.09 volts. This should be checked with more complete data.

It is however clear on our plates that bands with v' = 13 are absent or at least so weak that they do not appear among the lines of the preceding bands with v' = 12. This is clearly due to predissociation of the v' = 13 state of $B^3\Pi$. As van der Ziel found previously the interaction leading to predissociation must be extremely small. This has as consequence that as higher vibrational levels become more remote from the dissociation limit the bands begin to reappear again. Bands with v' = 14 though very weak are clearly present, those with v' = 15 are stronger, etc. The 17-12 band was strong enough so that its rotational structure could at least partly be analyzed (see table 11).

Unfortunately the Δv = 4, 5, 6 sequences which show the transitions from the high vibrational states most prominently fall into a very unfavorable region of the spectrum for our particular spectrograph. The geometry of the instrument precludes the second order. In the first order the grating is extremely weak in this wavelength range which is aggravated by the sensitivity minimum of the photographic emulsion, and the resolution here is lower than in the rest of the spectrum. These considerations have made it impractical to attempt at this time the rotational analysis of bands with even higher v' values though such bands are visible to v' = 21 or higher.

9. Perturbations

There are no observed irregularities in the levels of the $A^3\Sigma$ and $B^3\Pi$ states at least for the values of v and J considered here except the predissociation of $B^3\Pi$ discussed in the preceding section.

There are many small perturbations, however, in the $C^3\Pi$ levels which manifest themselves in irregularities in the rotational structure of the bands of the second positive group. Many of these perturbations were

*The numerical values concerning the N_2 states are taken from Mulliken (1957)

recognized by the early observers and have been most completely studied by Coster, Brons and v. d. Ziel (1933) with some later comments by Guntsch (1933). None of these authors have reached a satisfactory interpretation.

In examining our plates and measurements we find that the perturbations are much more extensive than hitherto reported. Most energy shifts are however small. They can easily be masked by blends, or perturbations may be suggested by unrecognized blends. In order to establish such perturbations clearly several bands with the same v' should be available preferably each measured at different rotational temperatures. Time has so far been lacking to make such a thorough and tedious analysis and therefore the following remarks must be considered as preliminary. We expect to continue the analysis when time permits.

There are two observable effects of the perturbations, shift of an energy level and anomalous intensities. Both effects are seen conspicuously in the second positive group.

The cause of perturbations is, as first shown by Kronig, the interaction between two neighboring states through a small interaction term in the Hamiltonian that is usually left out when an approximate solution of the wave equation is required. Such an approximate solution is usually adequate for describing the energy levels except in the immediate vicinity of the perturbations.

Kronig showed that two states can interact with each other only if they have the same J and the same symmetry. Moreover the values of Λ must differ by ± 1 (class A or rotational perturbations) or by zero (class B or vibrational perturbations). In both cases the perturbation will affect the rotational levels; in class A perturbations the interaction is between rotational and electronic motion, in class B between vibrational and electronic motion. Furthermore triplet states are perturbed in general more easily by triplet states than by states of other multiplicities.

We may say that the perturbation is explained when the perturbing state is identified. Such an identification has not been possible so far for any perturbations in the $C^3\Pi$ levels although Coster, Brons and van der Ziel held a $^3\Delta$ level responsible for the perturbations in the $v' = 3$ levels.

If the perturbing states are separated by an interval 2δ and the interaction matrix element is S the magnitude of the displacement is

$$\epsilon = \delta \mp \sqrt{\delta^2 + S^2} \qquad (6)$$

where the upper sign holds for $\delta > 0$ the lower one for $\delta < 0$. The perturbing state has a displacement of the same magnitude but the opposite sign.

When the perturbation matrix contains also diagonal elements the formulae are slightly more complicated but no essential features are changed as the perturbations through the diagonal elements can be applied

first and changes the distance 2δ into $2\delta' = 2\delta - S_{11} + S_{22}$, and the average value into

$$\delta_0 = \frac{2\delta + S_{11} + S_{22}}{2}$$

(6) becomes then

$$\epsilon = \delta_0 \mp \sqrt{\delta'^2 + S^2}$$

The wave functions are

$$\psi_1 = a_{11}\psi_1^0 + a_{12}\psi_2^0$$
$$\psi_2 = a_{21}\psi_1^0 + a_{22}\psi_2^0$$

where the coefficients a_{ij} can be calculated in terms of δ and S and form a unitary matrix.

Let us consider transitions to a lower state 3 and consider the matrix components D_{13} and D_{23} of the electric moment of the perturbed states. Let us assume that D_{13}^0 and D_{23}^0 respectively are the analogous quantities for the unperturbed states and that $D_{23}^0 = 0$ that therefore the perturbing state 2 does not combine with the lower state through an allowed dipole transition. We have then

$$D_{13} = a_{11}D_{13}^0 \qquad D_{23} = a_{21}D_{23}^0$$

and the intensities are proportional to the squares* of these quantities

$$I_{13} = \alpha\, a_{11}^2 D_{13}^{0\,2} = a_{11}^2 I_{13}^0$$
$$I_{23} = a_{21}^2 I_{13}^0$$
or
$$I_{13} + I_{23} = (a_{11}^2 + a_{21}^2) I_{13}^0 = I_{13}^0$$

because of the unitary character of the a_{ij} matrix.

We have thus the following situation. Where without the perturbation we have one line with the intensity I_{13}^0 we have now two lines but the sum of the intensities of the two lines must equal that of the single unperturbed line.

If the perturbation is due to an interaction between more than two levels the situation may be considerably more complex. We shall pursue first the simpler case.

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*All quantities are assumed to be real. Should they be complex the square of the modulus replaces the squares.

For the second positive group the state labelled (1) is $C^3\Pi$, the state (3) is $B^3\Pi$ and the state (2) the unknown perturbing level which must have the same J as (1). We know that (2) does not combine noticeably with (3) because otherwise we would see bands corresponding to these transitions in the vicinity of the particular second positive group band, and such bands are not observed.

We find a number of cases of energy level shifts, particula ly well pronounced for v = 1. There are also cases where there are anomalous intensities without noticeable energy shifts. In some cases lines practically disappear (see the examples given for v' = 3). We have just seen that under the assumption of perturbations by an interacting pair such a disappearance is impossible. A line might be weakened but there should be then an additional line to make up for the lost intensity. These abnormal intensities must therefore have another explanation.

The intensity of a spectrum line is the product of the transition probability and the number of molecules in the upper state. The usual explanation of anomalous intensities in perturbations attributes them to anomalous transition probabilities. We believe that there is good evidence that for the second positive group the abnormal intensities are due to abnormal occupation numbers in the levels of the $C^3\Pi$ state. We shall first give the empirical evidence concerning the perturbations as it can be obtained from the limited material available.

v = 0. No perturbations have previously been reported in this vibrational level. There seem, however to be small irregularities in the Λ-doubling close to the limits of experimental errors. There is one such case in F_1 for J = 18. The Λ-doubling for both $R_1 17$ and $P_1 19$ is 0.09 cm^{-1} smaller than for neighboring lines, and it appears that the weak (short wavelength) component is perturbed.

Perturbation of only one component in a Λ-doublet is an indication (though not a proof) that the perturbing level is a Σ-level. It would have to have weak levels for even J. The $a'^1\Sigma_u$ level has this property. The fact that we are dealing with a triplet singlet perturbation would explain the smallness of the effect. Further measurements will have to show whether this perturbation is real. Extrapolation from the known levels of $a'^1\Sigma_u$ shows that the v = 16 level of that state has approximately the right position to be responsible for the perturbation.

The bands with v' = 0 show other pecularities. Fig. 6 shows a microphotometer trace of the R-branch of the 0-0 band taken at low pressure and temperature. It shows that successive triplets are alternately weak and strong (K" even: strong, K" odd: weak). Furthermore it is apparent that the ratio of the strong to the weak component in the R_1 Λ-doublets is large for even J' and close to one for odd J' instead of the expected constant ratio 2:1. This is observed also for other values of v'. The significance of this will be discussed later on.

v' = 1 (obtained from 1-4 band and qualitatively checked on microphotometer traces of other $1 \longrightarrow v''$ bands). Here genuine perturbations

have been reported previously. There was a difference of opinion about these perturbations between Guntsch on the one side and Coster and collaborators on the other side. Our own observations tend to give us a structure of the perturbations which does not agree completely with either Coster or Guntsch, but it needs verification in other bands.

$R_1 20$ and $P_1 22$ show a conspicuous anomaly. Instead of the regular two components of the Λ-doublet there are four components. We can calculate the expected position of the doublet by fitting a quadratic interpolation formula to the previous six R_1 lines, and do the same thing for $P_1 22$. We obtain

	Extrapol.	Observed lines	Displaced from (s)	(w)
$R_1 20$	25 183.77 (s)	185.15 (5)	+1.38	+1.68
	183.47 (w)	184.08 (7)	+0.31	+0.61
		183.68 (8)	-0.09	+0.21
		183.26 (6)	-0.51	-0.21
$P_1 22$	25 055.75 (s)	057.13 (6)	+1.38	+1.61
	055.52 (w)	056.08 (6)	+0.33	+0.56
		055.62 (10)*	-0.13	+0.10
		055.25 (7)	-0.50	-0.27

All observed $R_1 20$ lines are free from known blends, while the lines of $P_1 22$ marked by an * are blended by lines which are weak when the rotational temperature is low. The presence of the four lines is thus well established and confirmed by other bands with $v' = 1$ (Fig. 7). The agreement of the shifts in column (s) is excellent but deceptive as we shall presently see.

As both the strong and weak components are shifted there must be a pair of perturbing levels with opposite symmetry such as the two components of a lambda doublet. We should have therefore two lines with strong and two with weak symmetry, the first combining with a strong the second with a weak lower level. In order to find the shifts we must therefore take two values from column (s) and two from column (w). It seems reasonable to assume that the strongest components come from the unperturbed strong line. With this assumption we obtain the choice indicated by the underlined values. We next find the unperturbed lambda doubling of the upper level for $J = 21$ by extrapolating from the preceding unperturbed values and find 1.15 cm^{-1}. This gives the arrangement of the unperturbed and perturbed levels as indicated in Fig. 8 . If we keep in mind that the upper level of a perturbing pair is just as much pushed up as the lower one is pushed down we obtain the broken levels as the unshifted position of the perturbing Λ-doublet.

Should there be any diagonal terms in the perturbation matrix and should they differ for the two states the broken levels give the position after the diagonal perturbation has been applied.

The narrowness of the Λ-doublet of the perturbing level is quite compatible with the perturbing state being a Δ-state.

For the F_2 state J = 17 a similar analysis can be made but less reliably so as because of interference with other lines the four components cannot be all located with certainty.

Finally for F_3, J = 13 the shift is small (about -0.20) and there is strong interference both in the 1-3 and 1-4 bands but not in the 1-7 band. No extra line has been observed. That this is a genuine perturbation is supported by evidence on the intensities of these lines in the argon nitrogen afterglow.

In the A-N_2 afterglow described in section 2, the 2nd positive group is very weak compared to the 1st positive group. In all bands with v' = 1 the perturbed lines just described (J_1 = 21, J_2 = 17, J_3 = 13) are conspicuously enhanced in intensity so that they stand out prominently (Fig. 9). This shows quite decisively that in this case the anomalous intensities cannot be due to abnormal transition probabilities for these could not be affected in this way by the discharge conditions.

The mechanism is probably as follows. The transfer of energy from the excited or ionized argon atoms will preferentially excite a particular state through a process not yet understood. Through collisions this energy is transferred to the $C^3\Pi$ state when an energy level is very near, which is the case when a perturbation occurs. When the number of collisions between N_2 molecules is very large, thermal equilibrium is established and the perturbed levels do no more have an anomalously high population.

We do not have sufficient information to fix the nature of the intermediate state. We have seen above that it is very likely a Δ-state and we know that there is both a $^1\Delta_u$ and $^3\Delta_u$ state below $C^3\Pi$ the higher vibrational states of which would have the right energy to cause the perturbations. The $^3\Delta_u$ state has not been found empirically, the lower vibrational levels of $w^1\Delta_u$ are known. A rough extrapolation shows that v = 13 of $w^1\Delta_u$ could be the state.

We know that singlet and triplet states can interact weakly in N_2 and the idea that a singlet state could be preferentially excited looks attractive. There are however a number of other facts unexplained by this choice. One of these is the behavior of the other perturbations for v = 1. These will now briefly be outlined.

J_1 = 21	treated above
= 22	normal
= 23	gives rise to strong single $R_1$22 line; -0.21 cm^{-1} from expected position
= 24 to 40	all lines have normal Λ-doubling $R_1$24-26 are about 0.14 higher than calculated position. No higher R_1 lines reliably observable. Extrapolation for the P_1 lines not sufficiently accurate

J_2 = 17 treated above
= 18 to 21 +0.15, 0.12, 0.09, 0.04 respectively from expected value but with normal Λ-doubling.
= 22 weak component of $R_2 21$ close to calculated position strong one +0.48. Λ-doubling 0.57. Evidence of at least one extra line.
No conspicuous perturbations observed for $J_2 > 22$.

No clear perturbations observed for the F_3 component for $J_3 > 13$.

The presence of these additional perturbations is incompatible with their being all caused by one $^1\Delta$ state. A $^3\Delta$ state on the other hand could produce three perturbations in each triplet component. The situation is not clear enough at the present time to decide whether the perturbations in the v' = 1 state are all produced by one $^3\Delta$ state or whether the additional perturbations are due to interaction with an entirely different state.

We have had no opportunity yet to examine in detail the perturbations for v' = 2 which Coster, Brons and van der Ziel attributed to a $^3\Pi$ state.

For v = 3 the situation is as follows.

The conspicuous features in the bands with v' = 3 are not displacements of energy levels but intensity anomalies. The situation in the R-branches of the 3-5, 3-7 and 3-8 bands is shown in Fig. 10. There are no conspicuous anomalies up to K" = 14. The K" = 15 triplet has the middle component very much weakened. For K" = 16 the two outer components are weak particularly R_1. The K" = 17 triplet is entirely missing. In K" = 18 the outer components are weak particularly R_3 and for K" = 19 the middle component is weak.

In all these cases there are no conspicuous energy shifts. In some cases the lines are so weak that it is not certain whether they are present or not because of interfering weak lines of different origin nearby. The analysis of other bands with v' = 3 will undoubtedly improve the situation in this respect.

We have seen above that the disappearance or conspicuous weakening of lines cannot be explained by anomalous transition probabilities due to perturbations when only a pair of levels interact. The disappearance of discrete emission lines is observed when predissociation is present and is a more sensitive criterion for predissociation then the broadening of lines. For v = 3 of $C^3\Pi$ there is no reason to suspect predissociation as these levels are much above the $^4S+^4S$ and below the $^4S+^4D$ limit. There would be no reason for particular rotational states being selectively affected.

There is however the possibility of interaction of two discrete states through collisions, when the second state has slightly less energy than the first and both states have the proper symmetry. Such collisions have a particularly large cross section and will depopulate the first state. There is not quite enough evidence at present to fix the nature of the interacting state. This process is evidently just the opposite of what is observed for the perturbed levels of v = 1 in the argon afterglow as shown in Fig. 9.

A similar process will also explain the in· ·sity anomalies in the 0-0 band shown in Fig. 6. The lines R 16 to r . o wc ld not occur in thermal equilibrium at the effective temperature of t· discha. · and are absent in most other bands. For this reason we belie e that thes levels are populated by collisions with molecules in another state lying above t and in order to account for the observed phenomena this state should be . Σ state. We know that only strong levels can interact with strong levels e· .n in collisions. Furthermore we assume that the interaction is ... . a minus level will interact only with a minus level or at least preferentially so, and a plus level with a plus level.

If the situation is as shown in Fig. 11 the strong Σ rotational levels can interact only with the strong lower components of the Π states i.e. those with odd K. This means that these states are preferentially strenghtened which has as consequence that the lines coming from such states i.e. the even numbered lines, are relatively stronger than the odd numbered ones. Moreover the strong component of the Λ-doublet is strengthened. For the even numbered K of $C^3\Pi$ the situation is reversed. The weak component of the Λ-doublet is strengthened but not as much as the strong one for odd J. This makes the resultant line relatively weaker and the resultant Λ-doublets have a relatively strong weak component. For a collision the J values do not necessarily have to be the same.

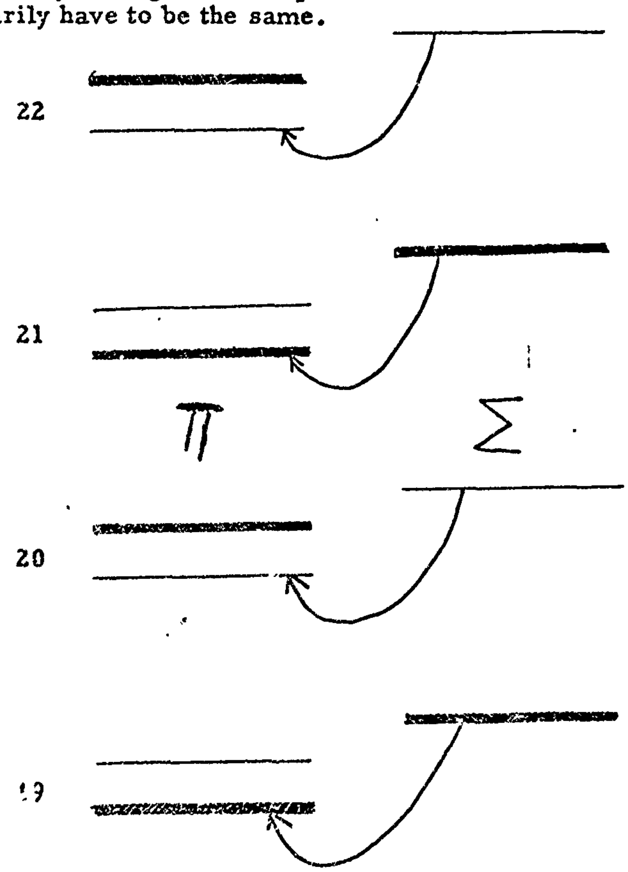

Figure 11

This is what is observed. We cannot expect that the process sketched here is the only one which can populate the higher rotational levels of the $C^3\Pi$ state and therefore the anomalies do not show as pronouncedly as they would if there were no other process.

While we have here a process by which the observed anomalies can be explained qualitatively the details are by no means clear. The nature of the interaction should be better understood before quantitative calculations are possible. What seems probable however is that we have under certain discharge conditions considerable deviations from thermal equlibrium in the second positive group from which important clues can be obtained as to the nature of the excitation mechanism.

10. Comparison with Previous Work and General Outlook

For the first positive group our results agree well with those of Feast and Carroll for the 1-0 band except for the lines near the origin where our interpretation is often different. This is understandable as all previous work was done at higher rotational temperatures at which the lines near the origin are usually weak and not easily identifiable in the very crowded portions of the bands. Our analysis is in general agreement with that of Naudé, although we have not duplicated the analysis of the two bands he studied. We differ for a considerable part with van der Ziel in the identification of the lines in the 12-8 band but agree in general for $J > 8$.

The energy levels in tables 5-7 should in general be accurate to within a few times 0.01 cm^{-1}. The actual errors may at times however exceed this amount. This is due to two reasons. Grating wavelength measurements are subject to small systematic errors caused by a shift of the comparison spectrum. Such a shift which may be due to several causes is virtually impossible to avoid. We have observed such shifts in our measurements usually of the order of a few thousands of an Å. Whenever we have used measurements from several plates we have corrected for such a shift by assuming arbitrarily one set to be the correct one. This should not affect the relative values of the wave numbers but may have introduced a small systematic error in the absolute values. This is of no great consequence. If such an error exists it may be different for the bands of the first and second positive groups.

The accuracy with which the combination relations are fulfilled and the consistency of values obtained from different plates indicate that the accidental errors of measurement should not exceed in general 0.01 or 0.02 cm^{-1}. This is true only for good lines, that is lines which are not blends or part of a very close doublet or very weak. For the unfavorable lines the error may be considerably greater, in the most unfavorable cases (a weak line blended by a strong one) up to the resolution of the grating or the width of line. Blends have usually been excluded from the calculation of the energy levels. Such calculations often have been made when the analysis was not completed and the blends therefore not all recognized. We could undoubtedly increase the accuracy of the energy levels somewhat by repeating the calculations systematically taking into account all data now available. It is more than questionable that the slight improvement that might be expected would be commensurate with

the considerable additional labor that such a procedure would entail

As mentioned earlier, levels with high J may have considerably larger cumulative accidental errors than those with low and medium J.

For the second positive group extensive previous data exist. It appears that our resolution is considerably better as shown particularly by the resolution of the R_2 and P_2 Λ-doublets. The increased resolution is partly due to the use of a better grating, partly to the increased sharpness of the lines in the low pressure low temperature discharge. For the same reasons, our wavelength accuracy appears to be somewhat higher than that of previous workers.

The main features of the structure of the bands of the second positive group had been firmly established and we find no disagreement with our results. As for the first positive group the low temperature brings out the lines in the vicinity of the origin which were often missing from previous analyses. In particular the short Q_2 and Q_3 branches are prominent in all bands and the Λ-doubling for the Q_2 branch easily established. The clean background at the low pressure made it possible for the first time to establish the weak satellite branches.

We believe that much more can be learned from the perturbations in the $C^3\Pi$ levels. The low temperature condition does not bring out the J-values at which they occur. For a thorough analysis of the perturbations the measurement and analysis of several bands with the same v' is necessary. Otherwise it will be difficult to decide whether the slight anomalies are genuine perturbations or due to blends. The chance for blends increases with the temperature of the gas and therefore the bands should be studied at several temperatures.

We have shown that intensity anomalies exist even in bands not affected by perturbations in the energy values. Such anomalies which indicate a departure from thermal equilibrium are important clues for the excitation mechanism, but more work needs to be done before their significance can be fully understood. Further knowledge about the structure of the other low lying states of the N_2 molecule would be very helpful. We hope to present some contribution to this in a subsequent report.

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Table 10

Selected Bands of the 2nd Positive Group of Nitrogen

The following bands are listed

Transition	λ	Disch.		Measurements on Plates			Page
1-1	3330	I		58P101c			47
0-0	3371	I		58P101c	59P328a	59P330a	47
2-3	3500	I		58P101d			50
2-4	3710	I		58P101e			50
1-3	3755	I		58P101e			51
1-4	3998	I	I_2	58P101f	59P355d		52
0-3	4059	I	I_2	58P101f	59P355d		53
4-8	4095	I	I_2	59P330d	59P355d		59
3-7	4142	I	I_2	59P330d	59P355d		61
1-7	4917	I		58P3801			67

I N_2 pressure 0.01 mm, discharge cooled with liquid nitrogen

I_2 N_2 pressure 1.0 mm

The intensities listed in the tables are eye estimates. Unclassified lines of intensity 0 or 1 have usually been omitted. The wavelengths are given for easy identification of the lines. They are not always the best averages.

All measurements were from second order plates with a dispersion of 0.6 Å/mm.

Table 10

Selected Bands of the 2nd Positive Group of Nitrogen

λ	I	ν	Classification 1-1		
3337.076	4	29 957.77			$Q_3$2
37.247	3	956.23	$P_1$3		
37.486	4	954.09	$P_1$4	$P_2$2	
37.690	3	952.26	$P_1$5		
37.767	2	951.57		$P_2$3	
37.861	3	950.72	$P_1$6		
38.008	4	949.40	$P_1$7	$P_2$4	
38.110	3	948.49	$P_1$8		
38.204	4	947.65	$P_1$10, $P_1$9	$P_2$5	
38.247	1	947.26			$P_3$3
38.305	1	946.74		$P_2$13	
38.363	3	946.22		$P_2$6	
38.442	1	945.51		$P_2$12	
38.480	4	945.17		$P_2$7	$P_3$4
38.522	1	944.79		$P_2$11	
38.555	2	944.50		$P_2$8	
38.584	3	944.24	[$P_2$10	$P_2$9	
38.661	3	943.55			$P_3$5
38.756	1	942.69			$P_3$11
38.789	3	[illegible].40			$P_3$6
38.871	2	941.66			$P_3$7
38.906	4	941.35		[$P_3$9	$P_3$8
				0-0	
39.149	1	939.17			$R_3$28
40.294	2	928.91			
40.507	2	927.00		$R_2$27	
40.764	2	924.70			$R_3$27
42.071	2	912.99		$R_2$26	
42.333	2	910.65			$R_3$26
43.366	2	901.41			
43.603	2	899.29			
43.867	2	896.93			
44.835	1	888.28	$R_1$26		
45.085	2	886.05		$R_2$25	
45.363	2	883.56			$R_3$24
46.277	3	875.40	$R_1$25		
46.536	3	873.09		$R_2$24	
46.816	3	870.59			$R_3$23
47.663	2d	863.03	$R_1$24		
47.938	3	860.58		$R_3$23	
48.234	3	857.94			$R_3$22
49.026	3	850.88	$R_1$23		
49.310	3	848.35		$R_2$22	
49.606	3	845.71			$R_3$21
50.324	2b	839.31	$R_1$22		
50.634	3	836.55		$R_2$21	
50.939	3	833.84			$R_3$20
51.219	2	831.34			

λ	I	ν	Classification 0-0		
3351.608	3	29 8[illegible]7.88	$R_1$21		
51.926	3	825.02		$R_2$20	
52.238	3	822.28			$R_3$19
52.002	1	817.26	$R_1$20		
52.838	2	816.94	$R_1$20		
53.168	3	814.01		$R_2$19	
53.498	3	811.07			$R_3$18
53.560	2	810.52			
53.741	2	808.91			
54.023	3	806.41	$R_1$19		
54.377	3	803.26		$R_2$18	
54.710	3	800.30			$R_3$17
54.938	2	798.28			
55.135	1	796.53	$R_1$18		
55.175	1	796.17	$R_1$18		
55.539	3	792.94		$R_2$17	
55.785	2	790.75			
55.899	3	789.74			$R_3$16
56.101	2	787.95			
56.176	1	787.28			
56.270	3	786.45	$R_1$17		
56.670	3	782.90		$R_2$16	
57.026	4	779.74			$R_3$15
57.221	2	778.01			
57.305	2	777.27	$R_1$16		
57.340	2	776.96	$R_1$16		
57.747	3	773.35		$R_2$15	
57.959	2	771.47			
58.091	2	770.30			
58.130	3	769.95			$R_3$14
58.290	3	768.53			
58.320	1	768.27	$R_1$15		
58.352	4	767.98	$R_1$15		
58.796	4	764.05		$R_2$14	
59.118	2	761.20		$P_2$33	
59.183	4	760.62			$R_3$13
59.294	3	759.63	$R_1$14		
59.326	4	759.35	$R_1$14		
59.783	4	755.30		$R_2$13	
59.801	3	755.15		$R_2$13	
59.966	3	753.68			
60.107	3	752.44		$P_2$32	
60.203	5	751.59			$R_3$12
60.225	4	751.39	$R_1$13		
60.259	7	751.09	$R_1$13		
60.313	3	750.61			
60.756	7	746.69		$R_2$12	
60.894	2d	745.47			
61.052	2	744.08		$P_2$31	
61.114	6	743.52	$R_1$12		

λ	I	ν	Classification 0-0			λ	I	ν	Classification 0-0		
3361.148	5	29 743.22	$R_1 12$			3366.294	12	29 657.76		$R_2 5$	
61.182	7	742.92			$R_3 11$	66.495	3	695.99			
61.258	2	742.25				66.528	2	695.69			
61.361	7	738.69		$R_2 11$		66.620	2	694.88			
61.679	6	733.53		$R_2 11$		66.686	13	694.30	$R_1 4$		
61.730	2	738.07			$Q_{32} 5$	66.711	11	694.08	$R_1 4$		
61.799	3	737.46				66.785	3	693.43			
61.957	7	736.07	$R_1 11$			66.834	2	692.99			
61.994	9	735.74	$R_1 11$			66.913	16	692.30		$R_2 4$	$R_3 4$
62.121	9	734.61			$R_3 10$	66.983	3	691.68		$Q_2 10$	
62.169	4	734.19				67.099	3	690.66		$Q_2 10$	
62.536	8	730.94		$R_2 10$		67.203	11	689.74	$R_1 3$		
62.557	9c	730.76		$R_2 10$		67.233	13	689.56	$R_1 3$		
62.605	3	730.34			$Q_{32} 4$	67.334	3	688.59			
62.655	2	729.90				67.391	2	688.08			
62.708	2	729.43				67.430	3	687.74		$Q_2 9$	
62.760	9	728.97	$R_1 10$			67.481	13	687.29		$R_2 3$	
62.798	8	728.63	$R_1 10$			67.527	1	686.88		$Q_2 9$	
63.022	10	725.65			$R_3 9$	67.569	13	666.52			$R_3 3$
63.371	10	723.57		$R_2 9$		67.680	12	685.54	$R_1 2$		
63.395	9	723.40		$R_2 9$	$R_{32} 3$	67.695	11c	585.40	$R_1 2$		
63.519	8	722.27	$R_1 9$			67.801	3	684.47		$Q_2 8$	
63.557	11	721.96	$R_1 9$			67.867	4	683.89			$Q_3 8$
63.636	4	721.23				67.903	3	683.57		$Q_2 8$	
63.728	2	720.41				67.925	3	683.38			
63.883	11	719.05			$R_3 8$	68.014	13	682.59		$R_2 2$	
63.999	2	718.02				68.124	10	681.62	$R_1 1$		
64.128	2	716.88			$R_{32} 2$	68.137	13	681.52	$R_1 1$		
64.159	9	716.61		$R_2 8$		68.179	13	681.14	[$P_2 21$	$Q_2 7$	$R_3 2$
64.178	11	716.44		$R_2 8$		68.227	2	680.71		$Q_2 7$	
64.235	11	715.93	$R_1 8$			68.266	7	680.37			$Q_3 7$
64.273	9	715.64	$R_1 8$			68.334	2	679.77			
64.414	3	714.35		$P_2 27$		68.387	2	679.31	$P_1 21$		
64.637	3	712.38				68.428	2	678.94	$P_1 21$		$P_3 20$
64.701	12	711.82			$R_3 7$	68.447	6	678.78		$R_2 1$	
64.771	3	711.20				68.500	12	678.31		$Q_2 6$	
64.850	2	710.50				68.536	10	677.99	$R_1 0$	$Q_2 6$	
64.909	13	709.98	$R_1 7$	$R_2 7$		68.615	9	677.30			$Q_3 6$
64.938	13	709.73	$R_1 7$			68.672	3	676.79		$P_2 20$	
65.149	4	707.86				68.711	5	676.45		$Q_2 5$	
65.375	4	705.87				68.759	6	676.03		$Q_2 5$	
65.404	2c	705.61				68.849	3	675.24	$P_1 20$		
65.478	13	704.95			$R_3 6$	68.880	1	674.97	$P_1 20$		
65.541	13	704.41	$R_1 6$			68.920	11	674.61			$Q_3 5$
65.570	10	704.15	$R_1 6$			68.962	5	674.24		$Q_2 4$	
65.634	12b	703.58		$R_2 6$		69.096	6	673.06		$Q_2 3$	
65.842	3	701.75				69.121	7	672.84		$Q_2 3$	
65.914	2	701.11				69.178	12	672.34			$Q_3 4$
65.993	2	700.42				69.226	8	671.91		$Q_2 2$	
66.026	2	700.12				69.257	10	671.64	$P_1 1$	$Q_2 1$	
66.074	3	699.70				69.309	13	671.18			
66.135	11	699.16	$R_1 5$			69.368	13	670.49			$Q_3 3$
66.162	14	698.92	$R_1 5$			69.465	2	669.81			
66.217	14	698.43			$R_3 5$	69.504	1	669.47		$P_2 18$	
66.281	13	697.87		$R_2 5$		69.539	10	669.16			

λ	I	ν	Classification 0-0		
3369.551	16	29 669.05			$Q_{3}2$
69.563	[illegible]	668.95	$P_{1}2$		
69.614	2	668.50			
69.673	3	667.98			
69.769	5	667.13			
69.844	15b	666.47	$P_{1}3$	$P_{2}17$	
69.907	4	665.92	$P_{1}17$		
69.964	2	665.42			
70.037	13	664.77		$P_{2}2$	$P_{3}16$
70.088	16	664.33	$P_{1}4$		
70.137	2	663.90	$P_{1}16$		
70.174	5	663.57	$P_{1}16$	$P_{2}16$	
70.227	3	663.10			
70.257	2	662.84			
70.302	16	662.44	$P_{1}5$		
70.322	15c	662.27		$P_{2}3$	
70.381	6	661.75	$P_{1}15$		
70.438	6	661.24		$P_{2}15$	$P_{3}15$
70.480	16	660.87	$P_{1}6$		
70.537	5	660.37	$P_{1}14$		
70.567	16c	660.11	$P_{1}14$	$P_{2}4$	
70.623	16	659.58	$P_{1}7$		
70.665	7	659.25		$P_{2}14$	
70.680	6	659.12			
70.690	7	659.03			
70.728	13	658.69	$P_{1}8$		$P_{3}14$
70.767	16c	658.35		$P_{2}5$	$P_{3}3$
70.807	13	658.00	$P_{1}9$		
70.824	13	657.85	$P_{1}10$	$P_{1}11]$	
70.841	12c	657.70	$P_{1}11$	$P_{2}13$	
70.932	16b	656.90		$P_{2}6$	$P_{3}13$
70.997	16	656.33		$P_{2}12$	$P_{3}4$
71.048	16	655.88		$P_{2}7$	
71.088	8	655.53		$P_{2}11$	
71.125	14	655.20	$[P_{2}10$	$P_{2}8$	
71.151	15c	654.97		$P_{2}9$	$P_{3}12$
71.165	15c	654.67			$P_{3}5$
71.278	9	653.85			$P_{3}11$
71.320	16	653.48			$P_{3}6$
71.377	11	652.98			$P_{3}10$
71.403	15c	652.76			$P_{3}7$
71.437	16	652.46		$[P_{3}9$	$P_{3}8$
71.503	2	651.88	g		
71.537	3	651.58	g		
71.626	3	650.79	g		
71.656	3	650.53	g		
71.698	3	650.16	g		
71.750	3	649.70	g		
71.852	2	648.81	g		
71.892	3	648.45	g		
72.021	3	647.32	g		
72.075	2	646.85	g		
72.108	3	646.56	g	$R_{12}3$	
72.142	3	646.26			
72.336	1	644.55		$R_{12}3$	

λ	I	I'	ν	Classification 0-0		
3372.748	1d		29 640.93		$R_{12}2$	
73.002	1		638.70			$Q_{23}8$
73.095	1d		637.88			$Q_{23}7$
73.143	2		637.46			$Q'_{23}7$
73.179	2c		637.14			$Q_{23}6$
73.225	3		636.74		$[Q_{23}5$	$Q'_{23}6$
73.262	4	8*	636.41		$[Q_{23}4$	$Q'_{23}5$
73.295	5	8	636.12	$[Q_{23}2$	$[Q_{23}3$	$Q'_{23}4$
73.335	0	4	635.77		$Q_{12}9$	
73.378		2	635.39			
73.429	2	6	634.95		$Q'_{12}6$	
73.467		3	634.61		$Q_{12}8$	
73.506		5	634.27		$Q'_{12}5$	
73.534		2	634.02			
73.559	2	5	633.80			
73.579		5c	633.63	$[Q'_{12}4$	$Q_{12}7$	
73.606		3	633.39	$[Q'_{12}1$	$Q'_{12}3$	
73.637		5	633.12		$Q'_{12}2$	
73.656		2	632.95			
73.676		4	632.78		$Q_{12}6$	
73.724		2	632.36			
73.750	2	6	632.13		$Q_{12}5$	
73.811	1	5	631.59			
73.833		1	631.40		$Q_{12}4$	
73.858		6	631.18	$[Q_{12}1$	$Q_{12}3$	
73.890		3	630.90		$Q_{12}2$	
73.914		4	630.69			
73.967	1	1	630.22		$P_{12}1$	
73.999		2	629.94			
74.034		4	629.63			
74.107		8	628.99			$P_{23}2$
74.239		1	627.83		$P'_{12}1$	
74.287		2	627.41			
74.391		2	626.50			$P_{23}3$
74.509		6	625.46			
74.637		3	624.34		$P'_{12}2$	
74.740		2	623.43		$P_{12}3$	
74.883		1	622.18			$P_{23}4$
74.906		3	621.98			$P'_{23}4$
74.979		2	621.34		$P'_{12}3$	
75.269		2	618.79			$P_{23}5$
75.298		1c	618.54			$P'_{23}5$
75.703		0	614.98			$R_{13}6$
75.767		00	614.42			$R_{13}5$
75.979		1d	612.56			$P_{23}7$
76.319		2	609.58			
76.538		2	607.66			
76.584		3	607.26			

g - First order ghosts of the strong lines in the edge

*From here on stronger exposure

λ	I	ν	Classification 2-3		
3490.252	1	28 643.06	$R_1$11		
90.984	1d	637.05		$R_2$10	
91.085	1d	636.23	$R_1$10		
91.598	1	632.02			$R_3$9
91.866	1	629.82		$R_2$9	
91.908	1	629.48			
91.948	2	629.15	$R_1$9		
92.538	2	624.31			$R_3$8
92.684	3	623.11	$R_1$8		
92.722	2	622.80	$R_1$8		
92.756	2	622.53		$R_2$8	
93.409	1	617.17	$R_1$7		
93.445	5	616.88	$R_1$7		$R_3$7
93.549	3	616.03		$R_2$7	
93.574	1	615.82		$R_2$7	
94.093	4	611.57	$R_1$6		
94.130	1	611.27	$R_1$6		
94.285	3	610.00			$R_3$6
94.333	3	609.61		$R_2$6	
94.729	2	606.37	$R_1$5		
94.764	4	606.08	$R_1$5		
95.033	4	603.88		$R_2$5	
95.057	1	603.68			
95.094	4	603.38			$R_3$5
95.320	4	601.53	$R_1$4		
95.355	2	601.24	$R_1$4		
95.711	4	598.33		$R_2$4	
95.855	4	597.15	$R_1$3		$R_3$4
95.897	3	596.81	$R_1$3		
96.320	4	593.35		$R_2$3	
96.376	3	592.89	$R_1$2		
96.406	1	592.65	$R_1$2		
96.561	4	591.38			$R_3$3
96.861	3	588.93	$R_1$1		
96.890	4	588.69	$R_1$1	$R_2$2	
97.215	3	586.03			$R_3$2
97.280	2	585.50	$R_1$0		
97.406	3	584.47		$R_2$1	
97.581	0	583.04			$Q_3$6
97.932	1	580.17			$Q_3$5
98.033	2	579.35	$P_1$1	$Q_2$3	
98.161	1	578.30		$Q_2$2	
98.229	2	577.75			$Q_3$4
98.260	3	577.49		$Q_2$1	$P_3$18
98.353	3	576.73	$P_1$2		
98.470	3	575.78			$Q_3$3
98.651	6	574.30	$P_1$3		$Q_3$2
98.720	00	573.74			$P_3$17
98.889	5	572.35	$P_1$4	$P_1$15]	
99.016	3	571.32		$P_2$2	
99.108	5	570.57	$P_1$5	$P_1$14]	$P_3$16
99.272	5	569.23	$P_1$6		
99.305	5	568.96	$P_1$13	$P_2$3	
99.426	5	567.97	$P_1$7	$P_1$13]	$P_3$15
99.500	3	567.37	$P_1$8		

λ	I	ν	Classification 2-3		
3499.547	6	28 566.98	$P_1$10	$P_2$4	
99.574	4	566.76	$P_1$9		
99.746	5	565.36	[$P_2$5	$P_2$12	$P_3$14
99.904	6	564.07	[$P_2$11	$P_2$6	$P_3$3
99.998	6	563.30	[$P_2$10	$P_2$7	$P_3$13
3500.[illegible]51	6	562.87	[$P_2$9	$P_2$8	
00.145	4	562.10			$P_3$4
00.184	1	561.78			$P_3$11
00.312	4	560.74		[$R_2$10	$P_3$5
00.429	5	559.79		[$P_3$9	$P_3$6
00.485	6	559.33		[$P_3$8	$P_3$7
				2-4	
3698.133	1	27 033.01			$R_3$11
98.931	0	027.18	$R_1$11		
98.981	2	026.81	$R_1$11		
99.353	2	024.09			$R_3$10
99.806	2	020.71		$R_2$10	
99.964	2	019.63	$R_1$10		
3700.014	1	019.26	$R_1$10		
00.519	3	015.58			$R_3$9
00.864	3	013.06		$R_2$9	
00.895	1	012.83		$R_2$9	
00.935	2	012.54	$R_1$9		
00.982	4	012.20	$R_1$9		
01.630	4	007.47			$R_3$8
01.847	4	005.89	$R_1$8		
01.878	1	005.66		$R_2$8	
01.900	5	005.50	$R_1$8	$R_2$8	
02.686	6	26 999.77			$R_3$7
02.706	2	999.62	$R_1$7		
02.745	6	999.34	$R_1$7		
02.832	5	998.70		$R_2$7	
02.861	2	998.49		$R_2$7	
03.499	6	993.84	$R_1$6		
03.542	4	993.53	$R_1$6		
03.683	6	992.50			$R_3$6
03.729	3	992.16		$R_2$6	
03.755	5	991.97		$R_2$6	
04.240	4	988.44	$R_1$5		
04.280	6	988.15	$R_1$5		
04.564	6	986.08		$R_2$5	
04.586	3	985.92		$R_2$5	
04.621	6	985.66			$R_3$5
04.926	7	983.44	$R_1$4		
04.964	5	983.17	$R_1$4		
05.336	3	980.46		$R_2$4	
05.359	6	980.29		$R_2$4	
05.504	7	979.23			$R_3$4
05.561	4	978.82	$R_1$3		
05.593	6	978.58	$R_1$3		
06.058	7	975.20		$R_2$3	
06.144	6	974.57	$R_1$2		

λ	I	ν	Classification 2-4		
3706.174	4	26 974.36	$R_1 2$		
06.323	7	973.27			$R_3 3$
06.680	3	970.67	$R_1 1$		
06.711	7	970.45	$R_1 1$	$R_2 2$	
06.893	0d	969.12			$Q_3 7$
07.079	6	967.77			$R_3 2$
07.168	3	967.12	$R_1 0$		
07.191	1	966.96	$R_1 0$		
07.300	5	966.16		$R_2 1$	
07.384	2	965.55			$Q_3 6$
07.814	3	962.43			$Q_3 5$
07.987	1	961.17		$Q_2 3$	
08.020	4	960.93	$P_1 1$		
08.140	3	960.05		$Q_2 2$	
08.175	5	959.80			$Q_3 4$
08.259	6	959.19		$Q_2 1$	
08.365	6	958.42	$P_1 2$		
08.472	6	957.64			$Q_3 3$
08.671	6	956.19	$P_1 3$		
08.697	8	956.00	$P_1 3$		$Q_3 2$
08.939	8D	954.25	$P_1 4$		
--09.056	3	953.40	$P_1 13$		$P_3 14$
09.102	6	953.06		$P_2 2$	
09.146	6	952.74	$P_1 5$		
09.167	8c	952.59	$P_1 5$		
09.228	3	952.15	$P_1 12$		
--09.318	7	951.49	$P_1 6$		
09.340	6c	951.33	$P_1 6$		
09.377	2	951.06	$P_1 11$		
09.411	8	950.82	$P_1 11$	$P_2 3$	$P_3 13$
09.438	2	950.62	$P_1 7$		
09.462	5	950.45	$P_1 7$		
09.480	2	950.31	$P_1 10$		
09.506	6	950.13	$P_1 8$	$P_1 9]$	$P_1 10]$
09.541	5	949.87	$P_1 8,9$		
09.574	2	949.63		$P_2 12$	
09.668	8	948.95		$P_2 4$	
09.764	2	948.25			$P_3 12$
09.793	4	948.04		$P_2 11$	
09.863	9	947.53		$P_2 5$	
09.913	1	947.17			
09.958	5	946.84		$P_2 10$	
10.001	8	946.53		$P_2 6$	
10.053	6	946.15		$P_2 9$	$P_3 11$
10.089	9b	945.89		$P_2 7,8$	$P_3 3$
10.288	5	944.45			$P_3 10$
10.327	8	944.16			$P_3 4$
10.453	6	943.25			$P_3 9$
10.490	8	942.78			$P_3 5$
10.557	7	942.49			$P_3 8$
10.580	7	942.33			$P_3 6$
10.606	7	942.14			$P_3 7$
--09.018	1	953.67	$P_1 13$		
--09.258	1	951.93	$P_1 12$		

λ	I	ν	Classification 1-3		
3738.320	1	26 742.41			$R_3 15$
38.592	1	740.46	$R_1 14$		
39.224	2	735.94		$R_2 14$	
39.762	2	732.09			
39.824	0	731.66			$R_3 13$
39.879	1	731.27	$R_1 14$		
39.930	1	730.90	$R_1 14$		
40.568	2	726.33		$R_2 13$	
40.599	1	726.11		$R_2 13$	
41.147	1	722.20	$R_1 13$		
41.192	7	721.88	$R_1 13$		$R_3 12$
41.872	1	717.03		$R_2 12$	
41.899	4	716.84		$R_2 12$	
42.353	4	713.59	$R_1 12$		
42.400	4	713.25	$R_1 12$		
42.502	5	712.53			$R_3 11$
43.118	5	708.13		$R_2 11$	
43.148	2	707.92		$R_2 11$	
43.497	3	705.43	$R_1 11$		
43.541	7	705.11	$R_1 11$		
43.776	6	703.43			$R_3 10$
44.302	4	699.68		$R_2 10$	
44.329	6	699.49		$R_2 10$	
44.578	7	697.72	$R_1 10$		
44.623	6	697.40	$R_1 10$		
44.988	8	694.80			$R_3 9$
45.425	8	691.68		$R_2 9$	
45.451	6	691.50		$R_2 9$	
45.597	6	690.46	$R_1 9$		
45.640	9	690.15	$R_1 9$		
46.148	9	686.53			$R_3 8$
46.485	7	684.13		$R_2 8$	
46.513	8	683.93		$R_2 8$	
46.556	9	683.62	$R_1 8$		
46.596	8	683.34	$R_1 8$		
47.243	10	678.73			$R_3 7$
47.451	8	677.25	$R_1 7$	$R_2 7$	
47.495	10br	676.94	$R_1 7$	$R_2 7$	
48.287	10	671.30	$R_1 6$		$R_3 6$
48.323	8	671.03	$R_1 6$		
48.416	8	670.38		$R_2 6$	
48.444	9	670.18		$R_2 6$	
49.066	8	665.78	$R_1 5$		
49.099	9	665.52	$R_1 5$		
49.259	9	664.39			$R_3 5$
49.292	9	664.15		$R_2 5$	
49.314	8	664.00		$R_2 5$	
49.783	9	660.66	$R_1 4$		
49.816	8	660.43	$R_1 4$		
50.096	8	658.44		$R_2 4$	
50.120	8	658.26		$R_2 4$	
50.174	10	657.88			$R_3 4$
50.398	0	656.29			$Q_3 9$
50.444	9	655.96	$R_1 3$		
50.476	10	655.73	$R_1 3$		

λ	I	ν	Classification 1-3		
3750.850	10	26 653.08		$R_2 3$	
50.902	0	652.71		$Q_2 8$	
51.025	10	651.83			$R_3 3$
51.058	10	651.60	$R_1 2$		$R_3 8$
51.082	9	651.43	$R_1 2$		
51.453	1	648.79		$Q_2 7$	
51.532	10	648.24		$R_2 2$	
51.613	9	647.66	$R_1 1$		
51.636	9	647.49	$R_1 1$		
51.810	10	646.26			$R_3 2$
51.890	3	645.69		$Q_2 6$	
52.123	10	644.03	$R_1 0$		$Q_3 6$
52.146	10c	643.87	$R_1 0$	$R_2 1$	
52.271	2	642.98		$Q_2 5$	
52.328	3	642.58		$Q_2 5$	
52.446	3	641.74			
52.573	9	640.84		$Q_2 4$	$Q_3 5$
52.622	3	640.49		$Q_2 4$	
52.695	2	639.97			
52.827	3	639.04		$Q_2 3$	
52.856	5	638.83		$Q_2 3$	
52.948	9	638.18			$Q_3 4$
53.005	9	637.77	$P_1 1$	$Q_2 2$	
53.029	4c	637.60			
53.136	10	636.84		$Q_2 1$	
53.254	10	636.00			$Q_3 3$
53.333	4	635.44			
53.363	10	635.23	$P_1 2$		
53.490	10c	634.33			$Q_3 2$
53.652	4	633.18			
53.684	10c	632.95	$P_1 3$		
53.777	5	632.29			$P_3 14$
53.948	10	631.08	$P_1 4$		
53.976	5c	630.88			
54.010	10	630.64		$P_2 2$	
54.132	6	629.78		$P_2 13$	
54.172	10	629.49	$P_1 5$		
54.204	6	629.27			$P_3 13$
54.301	2	628.58			
54.335	10c	628.34	$P_1 6$	$P_2 3$	
54.376	8	628.04	$P_1 11$		
54.452	10b	627.51	$P_1 7,10$		
54.506	10	627.12	$P_1 8$		
54.533	10c	626.93		$P_2 4$	
54.563	3	626.72			$P_3 12$
54.590	10	626.53		$P_2 4$	
54.676	8	625.92		$P_2 11$	
54.791	10	625.10		$P_2 5$	
54.853	8	624.66		$P_2 10$	
54.876	7c	624.50			$P_3 11$
54.931	10	624.11		$P_2 6$	$P_3 3$
54.968	9	623.85		$P_2 9$	
55.011	10b	623.54		$P_2 7,8$	
55.121	9	622.76			$P_3 10$
55.179	10	622.35			$P_3 4$

λ	I	I_2	ν	Classification 1-3		
3755.301	9		26 621.49			$P_3 9$
55.347	10		621.16			$P_3 5$
55.410	10		620.71			$P_3 8$
55.438	10c		620.51			$P_3 6$
55.463	10c		620.34			$P_3 7$
					1-4	
3956.350		6	25 268.70	$R_1 26$		
56.399		5	268.39	$P_1 41$		
56.443		3	268.11	$P_1 41$		
56.626		2	266.94		$P_2 40$	
56.645		4	266.82		$P_2 40$	
56.767		6	265.84		$R_2 25$	
56.819		5	265.71		$R_2 25$	
56.945		5	264.90			$P_3 39$
57.266		9	262.85			$R_3 24$
57.971		1	258.35			
58.191		1	256.95			
58.425		1	255.46			
58.494		2	255.01			
58.755		6	253.35	$R_1 25$		
58.803		8	253.04	$R_1 25$		
58.826		6	252.90	$P_1 40$		
58.874		2	252.59	$P_1 40$		
59.073		4	251.32		$P_2 39$	
59.225		6	250.35		$R_2 24$	
59.244		8	250.23		$R_2 24$	
59.389		5	249.30			$P_3 38$
59.706		10	247.28			$R_3 23$
61.086		9	238.49	$R_1 24$		
61.129		5	238.21	$R_1 24$		
61.193		4	237.81	$P_1 39$		
61.238		5	237.52	$P_1 39$		
61.457		5	236.12		$P_2 38$	
61.577		8	235.36		$R_2 23$	
61.594		7	235.23		$R_2 23$	
61.763		6	234.17			$P_3 37$
62.018		2	232.55			
62.072		10	232.21			$R_3 22$
62.317		2	230.65			
63.340		5	224.13	$R_1 23$		
63.397		8	223.77	$R_1 23$		
63.475		4	223.27	$P_1 38$		
63.520		3	222.99	$P_1 38$		
63.729		5	221.66		$P_2 37$	
63.746		3	221.55		$P_2 37$	
63.858		5	220.84		$R_2 22$	
63.860		7	220.70		$R_2 22$	
64.059		6	219.56			$P_3 36$
64.367		9	217.60			$R_3 21$
65.506		3	210.36			
65.578		10	209.90	$R_1 22$		

λ	I_2	ν	Classification 1-4			0-3
3965.687	3	25 209.20	$P_1$37			
65.734	6	208.91	$P_1$37			
65.947	3	207.55		$P_2$36		
65.966	4	207.43		$P_2$36		
66.000	6	207.21		$R_2$21		
66.051	2	206.89				$R_3$40
66.090	5	206.64		$R_2$21		
66.286	6	205.40			$P_3$35	
66.457	3	204.31		$R_2$21		
66.585	9	203.50			$R_3$20	
67.653	6	196.72	$R_1$21			
67.693	9	196.47	$R_1$21			
67.827	5	195.61	$P_1$36			
67.871	3	195.33	$P_1$36			
68.096	5	193.91		$P_2$35		
68.114	4	193.79		$P_2$35		
68.224	10	193.09		$R_2$20		
68.438	7	191.73			$P_3$34	
68.746	9	189.78			$R_3$19	
69.159	1	187.15				$R_1$41
69.215	2	186.80				$R_1$41
69.424	2	185.47				$R_2$40
69.474	4	185.15	$R_1$20			
69.645	7	184.08	$R_1$20			
69.707	8	183.68	$R_1$20			
69.738	2	183.48				$R_3$39
69.778	6	183.23	$R_1$20			
69.896	4	182.49	$P_1$35			
69.939	6	182.21	$P_1$35			
70.171	4	180.73		$P_2$34		
70.189	6	180.62		$P_2$34		
70.273	9	180.09		$R_2$19		
70.295	8	179.95		$R_2$19		
70.521	8	178.52			$P_3$33	
70.834	10	176.53			$R_3$18	
71.656	6	171.32	$R_1$19			
71.701	8	171.03	$R_1$19			
71.887	5	169.80	$P_1$34			
71.931	3	169.58	$P_1$34			
72.172	7	168.05		$P_2$33		
72.190	4	167.94		$P_2$33		
72.265	6	167.47		$R_2$18		
72.289	9	167.31		$R_2$18		
72.523	8	165.83			$P_3$32	
72.764	2	164.30				$R_1$40
72.806	1	164.04				$R_1$40
72.842	10	163.81			$R_3$17	
73.020	3	162.68				$R_2$39
73.344	3	160.63				$R_3$38
73.542	9	159.38	$R_1$18			
73.590	7	159.07	$R_1$18			
73.906	4	157.70	$P_1$33			
73.849	6	157.43	$P_1$33			
74.099	4	155.85		$P_2$32		
74.117	7	155.73		$P_2$32		

λ	I	I_2	ν	Classification 1-4			0-3
3974.183		8	25 155.32		$R_2$17		
74.207		7	155.16		$R_2$17		
74.460		8	153.57			$P_3$31	
74.521		1	153.18				
74.727		1	151.90				
74.787		10	151.50			$R_3$16	
75.359		7	147.88	$R_1$17			
75.406		9	147.58	$R_1$17			
75.650		6	146.04	$P_1$32			
75.694		4	145.76	$P_1$32			
75.746		1	145.43				
75.837		1	144.85				
75.888		1	144.53				
75.945		10	144.17		$P_2$31	$R_2$16	
75.971		10	144.01		$P_2$31		
76.160		1	142.81				
76.213		10	142.48		$R_2$16		
76.284		5	142.03		$R_2$16		
76.325		5	141.77			$P_3$30	$R_1$39
76.383		0	141.40				$R_1$39
76.563		3	140.26				$R_2$38
76.653		10	139.69			$R_3$15	
76.805		1	138.73				
76.881		3	138.25				$R_3$37
77.097		10	136.89	$R_1$16			
77.145		7	136.58	$R_1$16			
77.420		4	134.85	$P_1$31			
77.463		7	134.60	$P_1$31			
77.735		5	132.86		$P_2$30		
77.754		7	132.74		$P_2$30		
77.820		8	132.31		$R_2$15		
77.847		6	132.14		$R_2$15		
78.105		8	130.49			$P_3$29	
78.454	1d	10	128.30			$R_3$14	
78.762		7	126.36	$R_1$15			
78.811	2	9	126.06	$R_1$15			
79.116		7	124.13	$P_1$30			
79.156		5	123.88	$P_1$30			
79.440		8	122.09		$P_2$29		
79.457		7c	121.98		$P_2$29		
79.519		7	121.59		$R_2$14		
79.549	1	9	121.40		$R_2$14		
79.745		2	120.16				$R_1$38
79.793		2	119.86				$R_1$38
79.818		10	119.70			$P_3$28	
80.019		3	118.43				$R_2$37
80.173	2	10	117.45			$R_3$13	
80.351	1	10	116.34	$R_1$14			$R_3$36
80.399		7	116.04	$R_1$14			
80.738		6	113.90	$P_1$29			
80.781		8	113.62	$P_1$29			
80.973		3	112.41				
81.069		3	111.81		$P_2$28		
81.089		8c	111.68		$P_2$28		
81.148	2	8	111.30		$R_2$13		

λ	I	I_s	ν	Classification 1-4			0-3
3981.177	1c	6	25 111.11		$R_2$13		
81.457		10	109.36			$P_3$27	
81.862		9	106.81	$R_1$13			
81.879	4	9c	106.73			$R_3$12	
81.914	4	9	105.48	$R_1$13			
82.283		8	104.15	$P_1$28			
82.325		5	103.89	$P_1$28			
82.628		8	101.98		$P_2$27		
82.646		7c	101.86		$P_2$27		
82.704	1	5c	101.50		$R_2$12		
82.734	3	8c	101.31		$R_2$12		
83.024		10	099.48			$P_3$26	
83.134		2	098.79				$R_1$37
83.176		3	098.52				$R_1$37
83.299	4	9	097.75	$R_1$12			
83.351	4	7	097.42	$R_1$12			
83.408	0	2	097.06				$R_2$36
83.435	5	10	096.89			$R_3$11	
83.754		7	094.88	$P_1$27			$R_2$35
83.795		8	094.62	$P_1$27			
84.113		7	092.62		$P_2$26		
84.130	0d	9c	092.52		$P_2$26		
84.183	5	8	092.17		$R_2$11		
84.213	3	5	091.98		$R_2$11		
84.511	0d	10	090.12			$P_3$25	
84.659	3	7	089.18	$R_1$11			
84.711	7	9	088.85	$R_1$11			
84.948	6	10	087.36			$R_3$10	
85.144		9	086.13	$P_1$26			
85.183		6	085.88	$P_1$26			
85.518		8	083.78		$P_2$25		
85.535		8c	083.67		$P_2$25		
85.589	4	5	083.32		$R_2$10		
85.621	6	7	083.13		$R_2$10		
85.922		10	081.23			$P_3$24	
85.945	7	10c	081.10	$R_1$10			
85.993	6	6	080.78	$R_1$10			
86.390	8	10	078.29			$R_3$9	
86.439		2	077.98				$R_1$36
86.457	1r	7	077.87	$P_1$25			
86.508		9	077.55	$P_1$25			
86.740		4	076.09				$R_2$35
86.758		2c	075.97				$R_2$35
86.848		5	075.41		$P_2$24		
86.868		7c	075.28		$P_2$24		
86.919	8	7	074.96		$R_2$9		
86.950	5	5	074.76		$R_2$9		
87.093		4	073.87				$R_3$34
87.152	6	6	073.50	$R_1$9			
87.200	9	8	073.19	$R_1$9			
87.265		10	072.78			$P_3$23	
87.759	9	10	069.68	$P_1$24		$R_3$8	
88.038		8	067.93		$P_2$23		
88.126		6	067.37		$P_2$23		
88.175	6	5	067.06		$R_2$8		
3988.207	8	7	25 066.86		$R_2$8		
88.284	9	7	066.38	$R_1$8			
88.331	8	5	066.08	$R_1$8			
88.500		3	065.02		$P_2$23		
88.525		10c	064.86			$P_3$22	
88.886		7	062.60	$P_1$23			
88.920		9	062.38	$P_1$23			
89.055	10	10	061.53			$R_3$7	
89.303	1d	9	059.98		$P_2$22		
89.349	9	7	059.69	$R_1$7	$R_2$7		
89.386	10	8	059.45	$R_1$7	$R_2$7		
89.651		0	057.77				$R_1$35
89.700		2	057.48				$R_1$35
89.723		9c	057.24			$P_3$21	
89.756		6	057.13	$P_1$22			
89.924		6	056.08	$P_1$22			
89.997	1	10	055.62	$P_1$22			$R_2$34
90.056		7	055.25	$P_1$22			
90.280	10	8	053.84			$R_3$6	
90.324	10	6	053.56	$R_1$6			
90.364	9	5	053.31	$R_1$6			$R_3$33
90.406		9	053.05		$P_2$21		
90.450	9	4	052.77		$R_2$6		
90.481	10	6	052.58		$R_2$6		
90.839	1	10	050.33			$P_3$20	
90.992		7	049.37	$P_1$21			
91.028	00	9	049.14	$P_1$21			
91.240	9	5	047.81	$R_1$5			
91.276	10	7	047.58	$R_1$5			
91.427	10	9	046.64			$R_3$5	
91.443		9c	046.54		$P_2$20		
91.475	10	5	046.34		$R_2$5		
91.499	8	4	046.18		$R_2$5		
91.876	00	10	043.82			$P_3$19	
91.929		9	043.49	$P_1$20			
91.966		7	043.26	$P_1$20			
92.079	10	6	042.55	$R_1$4			
92.116	9	4	042.32	$R_1$4			
92.386		9	040.62		$P_2$19		
92.419	9	2	040.42		$R_2$4		
92.443	10c	6	040.26		$R_2$4		
92.499	10	8	039.91		$Q_2$9	$R_3$4	
92.694		2	038.69				
92.792		7	038.08	$P_1$19			
92.837		9	037.80	$P_1$19		$P_3$18	
92.852	9		037.70	$R_1$3			
92.882	10	5	037.51	$R_1$3			
92.161	1	10	035.76		$P_2$18	$Q_3$8	
92.195	1c	8	035.55		$Q_2$8		$R_2$33
93.292	10D	6	034.94		$R_2$3		
93.308		4c	034.84		$R_2$3		
93.430		10	034.08		$P_2$18		
93.491	10	6	033.69			$R_3$3	
93.512		6	033.56		$P_2$18		
93.551		6	033.32				$R_2$32

λ	I	I_2	ν	Classification 1-4			0-3		
3993.559	10		25 033.27	$R_{1}2$					
93.577		8	033.15	$P_{1}18$					
93.587	9		033.09	$R_{1}2$					
93.613		6	032.93	$P_{1}18$					
93.724	1	10	032.24			$P_{3}17$			
93.959	2		030.76		$Q_{2}7$				
94.014	4	2	030.44			$Q_{3}7$			
94.070		10	030.07		$P_{2}17$				
94.090	10	10c	029.98		$R_{2}2$				
94.203	9	2	029.23	$R_{1}1$					
94.225	10c	4c	029.09	$R_{1}1$					
94.286		7	028.71	$P_{1}17$					
94.322	2	9	028.49	$P_{1}17$					
94.398	10	4	028.01		$Q_{2}6$	$R_{3}2$			
94.487	0	1	027.45		$Q_{2}6$				
94.538	1	10	027.13			$P_{3}16$			
94.635	6	2	026.53			$Q_{3}6$			
94.792	10	10	025.54	$R_{1}0$	$R_{2}1$				
94.812		10c	025.42		$P_{2}16$				
94.846	2		025.20		$Q_{2}5$				
94.918	4	9	024.75	$P_{1}16$	$Q_{2}5$				
94.953	1	7	024.52	$P_{1}16$					
95.058	1bd	3	023.88						
95.179	8	3	023.11			$Q_{3}5$			
95.233	4		022.78		$Q_{2}4$				
95.245		2	022.71						
95.265		10c	022.58			$P_{3}15$			
95.274	3		022.52		$Q_{2}4$				
95.446	3	9	021.45		$P_{2}15$				
95.473	3c	7	021.27	$P_{1}15$					
95.509	4	9	021.05	$P_{1}15$					
95.535	3		020.89		$Q_{2}3$				
95.567	5		020.69		$Q_{2}3$				
95.643	10	4	020.21			$Q_{3}4$			
95.773	10	3	019.40	$P_{1}1$	$Q_{2}2$				
95.822		2	019.08						
95.917	10	4	018.50		$Q_{2}1$				
95.962	5	10	018.21	$P_{1}14$		$P_{3}14$	$R_{1}33$		
95.992	3	3	018.02	$P_{1}14$					
96.021	10	10	017.84		$P_{2}14$	$Q_{3}3$	$R_{1}33$		
96.095	0	2	017.38						
96.171	10	4	016.90	$P_{1}2$					
96.304	10	8	016.07			$Q_{3}2$		$R_{2}32$	
96.364	3	6	015.70	$P_{1}13$					
96.399	6	8	015.47	$P_{1}13$					
96.509		10	014.79		$P_{2}13$				
96.519	10b		014.73	$P_{1}3$					
96.531		10c	014.65			$P_{3}13$			
96.667		5	013.80						
96.696	6	7	013.61	$P_{1}12$					$R_{3}31$
96.731	5	5	013.40	$P_{1}12$					
96.801	10b	6	012.96	$P_{1}4$					
96.855	2	1	012.62						
96.895	9	3	012.37		$P_{2}2$				
96.933		7	012.13		$P_{2}12$				

λ	I_2	ν	Classification 0-3			λ	I_2	ν	Classification 0-3		
4010.307	2	24 928.73	$P_1$43			4027.438	5	24 822.69	$R_1$21		
10.345	1	928.49				27.483	7	822.41	$R_1$21		
10.387	5	928.23	$R_1$28			27.553	4	821.98	$P_1$36		
10.428	2	927.98	$R_1$28			27.592	2	821.74	$P_1$36		
10.473	2	927.70				27.805	5	820.43		$P_2$35	
10.756	3	925.94			$P_3$41	27.975	5	819.38		$R_2$20	
10.780	6	925.79		$R_2$27		27.994	7c	819.26		$R_2$20	
11.202	7	923.17			$R_3$26	28.123	5	818.47			$P_3$34
12.962	2	912.24	$P_1$42			28.489	8	816.21			$R_3$19
13.003	1	911.98	$P_1$42			29.569	7	809.56	$R_1$20		
13.051	3	911.68	$R_1$27			29.613	4	809.30	$R_1$20		
13.091	6	911.44	$R_1$27			29.679	1	808.89			
13.134	1	911.17		$P_2$41		29.715	2	808.67	$P_1$35		
13.169	2	910.95		$P_2$41		29.754	4	808.43	$P_1$35		
13.188	1	910.83				29.928	1	807.36			
13.466	8	909.11		$R_2$26	$P_3$40	29.982	5	807.02		$P_2$34	
13.890	7	906.48			$R_3$25	30.030	1	806.73			
15.583	1	895.98	$P_1$41			30.080	1	806.42			
15.636	7	895.65	$R_1$26	$P_1$41]		30.128	6	806.12		$R_2$19	
15.680	3	895.37	$R_1$26			30.147	5c	806.01		$R_2$19	
15.789	1	894.70		$P_2$40		30.300	5	805.06			$P_3$33
15.810	3c	894.57		$P_2$40		30.666	8	802.81			$R_3$18
16.065	6	892.79		$R_2$25		31.623	5	796.93	$R_1$19		
16.093	4	892.81		$R_2$25	$P_3$39	31.668	7	796.65	$R_1$19		
16.510	8	890.23			$R_3$24	31,802	4	795.83	$P_1$34		
18.131	3	880.19	$P_1$40			31.840	2	795.59	$P_1$34		
18.148	4c	880.08	$R_1$25	$P_1$40]		32.070	5	794.17		$P_2$33	
18.190	6	879.82	$R_1$25			32.213	5	793.30		$R_2$18	
18.354	3	878.81		$P_2$39		32.236	7c	793.16		$R_2$18	
18.607	6	877.24		$R_2$24		32.399	6	792.15			$P_3$32
18.656	4	876.94			$P_3$38	32.764	8	789.91			$R_3$17
19.051	8	874.49			$R_3$23	33.596	8	784.79	$R_1$18		
20.588	7	864.98	$R_1$24	$P_1$39]		33.642	3	784.52	$R_1$18		
20.635	6	864.69	$R_1$24	$P_1$39]		33.810	3	783.48	$P_1$33		
20.837	4	863.44		$P_2$38		33.850	4	783.23	$P_1$33		
21.052	7	862.11		$R_2$23		34.093	6	781.75		$P_2$32	
21.069	6c	862.01		$R_2$23		34.219	7	780.97		$R_2$17	
21.138	4	861.58			$P_3$37	34.241	5c	780.84		$R_2$17	
21.525	8	859.19			$R_3$22	34.422	6	779.72			$P_3$31
22.948	5	850.40	$R_1$23			34.792	8	777.45			$R_3$16
22.992	8	850.12	$R_1$23	$P_1$38]		35 506	4	773.07	$R_1$17		
23.038	2	849.84	$P_1$38			35.540	7	772.86	$R_1$17		
23.234	4	848.63		$P_2$37		35.742	5	771.62	$P_1$32		
23.433	4	847.40		$R_2$22		35.779	3	771.39	$P_1$32		
23.451	7c	847.29		$R_2$22		35.026	6	769.88		$P_2$31	
23.541	5	846.73			$P_3$36	36.146	4	769.14		$R_2$16	
23.919	8	844.40			$R_3$21	36.174	7	768.97		$R_2$16	
25.231	7	836.30	$R_1$22			36.365	7	767.80			$P_3$30
25.275	4	836.03	$R_1$22			36.685	1	765.84			
25.312	2	835.80	$P_1$37			36.742	9	765.48			$R_3$15
25.565	5	834.24		$P_2$36		37.314	7	761.97	$R_1$16		
25.743	7	833.14		$R_2$21		37.361	4	761.69	$R_1$16		
25.762	6c	833.03		$R_2$21		37.594	3	760.26	$P_1$31		
25.873	5	832.34			$P_3$35	37.631	5	760.03	$P_1$31		
26.244	8	830.05			$R_3$20	37.893	6	758.43		$P_3$30	

λ	I	I_s	ν	Classification 0-3		
4038.003		7	24 757.75		$R_2$15	
38.026		6c	757.61		$R_2$15	
38. 33		7	756.34			$P_3$29
38.623		8	753.95			$R_3$14
39.054		5	751.31	$R_1$15		
39.102	1	8	751.01	$R_1$15		
39.369		6	749.38	$P_1$30		
39.405	0	3	749.16	$P_1$30		
39.672	1d	7	747.52		$P_2$29	
39.761		4	746.85		$R_2$14	
39.809	1	7	746.68		$R_2$14	
40.024		8	745.37			
40.417	2	9	742.96			$R_3$13
40.716	1	8	741.13	$R_1$14		
40.762	1	4	740.85	$R_1$14		
41.065	0	4	738.99	$P_1$29		
41.100		6	738.78	$P_1$29		
41.384		8	737.04		$P_2$28	
41.476	1	8	736.48		$R_2$13	
41.509	1c	5	736.27		$R_2$13	
41.736	1	8	734.88			$P_3$27
42.146	2	9	732.37			$R_3$12
42.293	1	5	731.48	$R_1$13		
42.340	3	8	731.19	$R_1$13		
42.680	0	6	729.11	$P_1$28		
42.718	2	4	728.87	$P_1$28		
43.005	2	8	727.12		$P_2$27	
43.027	1c		726.98		$P_2$27	
43.098	1	4	726.55		$R_2$12	
43.129	3	7	726.36		$R_2$12	
43.211	2		725.86			
43.368	0	8	724.90			$P_3$26
43.795	5	10	722.29	$R_1$12		$R_3$11
43.842	2	5	722.00	$R_1$12		
44.218		4	719.70	$P_1$27		
44.255	1d	6	719.48	$P_1$27		
44.426	5		718.43			
44.560	1	8	717.61		$P_2$26	
44.645	3	7	717.09		$R_2$11	
44.675	2	4	716.91		$R_2$11	
44.926		8	715.38			$P_3$25
45.216	3	5	713.60	$R_1$11		
45.264	6	7	713.31	$R_1$11		
45.376	5	8	712.63			$R_3$10
45.613		2	711.18			
45.677		7	710.79	$P_1$26		
45.717		4	710.54	$P_1$26		
46.023		8	708.68		$P_2$25	
46.112	3	4	708.13		$R_2$10	
46.144	5	6	707.94		$R_2$10	
46.403	00	8	706.35			$P_3$24
46.559	6	7	705.40	$R_1$10		
46.609	9	4	705.10	$R_1$10		
46.876	6	8	703.46			$R_3$9
47.055		4	702.38	$P_1$25		

λ	I	I_s	ν	Classification 0-3		
4047.091		7	24 702.16	$P_1$25		
47.421	1	8	700.14		$P_2$24	
47.500	6	6	699.66		$R_2$9	
47.532	4	4	699.46		$R_2$9	
47.638	2		698.81			
47.800		8	697.83			$P_3$23
47.822	5	7c	697.69	$R_1$9		
47.870	8	7	697.40	$R_1$9		
48.306	8	7	694.74			$R_3$8
48.358	0	7	694.42	$P_1$24		
48.39[illegible]		4	694.22	$P_1$24		
48.732		8	692.14		$P_2$23	
48.809	5	4	691.67		$R_2$8	
48.841	7	6	691.48		$R_2$8	
48.947		2	690.83			
49.007	8	6	690.47	$R_1$8		
49.034		2	690.30			
49.053	7	4	690.18	$R_1$8		
49.122	0	8	689.76			$P_3$22
49.582		5	686.96	$P_1$23		
49.617		7	686.75	$P_1$23		
49.654	9	7	686.52			$R_3$7
49.705	0	2	686.21			
49.758	0	4	685.89			
49.973	1	8	684.58		$P_2$22	
50.038	8	5	684.18		$R_2$7	
50.070	6	3	683.99		$R_2$7	
50.113	6	4	683.72	$R_1$7		
50.158	9	7	683.45	$R_1$7		
50.363	1	9	682.20			$P_3$21
50.722		8	680.01	$P_1$22		
50.759		6	679.79	$P_1$22		
50.930	9	7	678.74			$R_3$6
51.114		7	677.62		$P_2$21	
51.140	9	6	677.46	$R_1$6		
51.183	8	4	677.20	$R_1$6	$R_2$6	
51.214	8	5	677.01		$R_2$6	
51.400	0	2	675.88			
51.525	1	9	675.12			$P_3$20
51.783		5	673.55	$P_1$21		
51.820	1d	7	673.32	$P_1$21		
51.967	2		672.43			
52.077		4	671.76			
52.095	8	5c	671.65	$R_1$5		
52.130	10b	7	671.44	$R_1$5		$R_3$5
52.190	1	5	671.07		$P_2$20	
52.203		7c	670.99		$P_2$20	
52.252	10	4	670.69		$R_2$5	
52.280	8	2c	670.52		$R_2$5	
52.612	1	9	668.50			$P_3$19
52.766		7	667.57	$P_1$20		
52.799	1	5	667.36	$P_1$20		
52.976	10	5	666.29	$R_1$4		
53.012	8	3	666.07	$R_1$4		
53.063		5	665.76			

λ	I	I_2	ν	Classification 0-3			4-8
4053.119	0	2	24 665.42				
53.192	1	8	664.97		$P_2$19		
53.237	10	6	664 70		$R_2$4	$R_3$4	
53.261	10	5c	664.55		$R_2$4		
53.361		2	663.94				
53.619	1	9	662.37			$P_3$18	
53.682	1	6	661.99	$P_1$19			
53.704	1c	7c	661.86	$P_1$19			
53.782	8	6	661.38	$R_1$3			
53.816	10	5	661.17	$R_1$3			
54.084	3		659.54				
54.096		2	659.47			$Q_3$8	
54.114	1	6c	659.36		$P_2$18		
54.143	9	2	659.18		$R_2$3	$P_2$18	
54.161	8		659.07		$R_2$3		
54.270	10	4	658.41			$R_3$3	
54.471		4	657.19				$R_3$24
54.493		6c	657.06	$P_1$18			
54.522	9		656.88	$R_1$2			
54.530		6c	656.83	$P_1$18			
54.547	8	9c	656.73	$R_1$2		$P_3$17	
54.818	3		655.08			$Q_3$7	
54.953		9	654.26		$P_2$17		
54.970	7	6c	654.15		$R_2$2		
54.981	9c		654,09		$R_2$2		
55.195	7		652.79	$R_1$1			
55.216	10c	4	652.66	$R_1$1			
55.239		4	652.52	$P_1$17			
55.271		7	652.33	$P_1$17			
55.279	2		652.60				
55.333	2		651.95				
55.348		3	651.86				$R_1$25
55.390	2	9	651.60			$P_3$16	
55.466	4	1	651.14			$Q_3$6	
55.716	10	9	649.62		$R_2$1	$P_2$16	
55.767	2	1	649.31		$Q_2$5		
55.808	7	2	649.06	$R_1$0			
55.845	2	1	648.84	$R_1$0	$Q_2$5		
55.904		7	648.48	$P_1$16			
55.935	1	5	648.29	$P_1$16			
55.988	2	1	647.97				
56.037	6	2	647.67			$Q_3$5	
56.088	1	5	647.36				$R_2$24
56.157		9	646.94			$P_3$15	
56.168	4		646.87		$Q_2$4		
56.220	2	0	646.56		$Q_2$4		
56.383	2	8	645.56		$P_2$15		
56.397		7c	645.48		$P_2$15		
56.487	3	5	644.94	$P_1$15	$Q_2$3		
56.518	10	8	644.75	$P_1$15		$Q_3$4	
56.640		2	644.01				
56.722	5	2	643.51		$Q_2$2		
56.748	4c	2	643.35				
56.804		5	643.01				$R_3$23
56.836	8		642.82	$P_1$1			

λ	I	I_2	ν	Classification 0-3			4-8
4056.849		8	24 642.74			$P_3$14	
56.885	9	3	642.52		$Q_2$1		
56.907	10	4c	642.38			$Q_3$3	
56.992	4	10	641.87	$P_1$14	$P_2$14		
57.021	2	4	641.69	$P_1$14			
57.202	10	5	640.59			$Q_3$2	
57.251	10	3	640.30	$P_1$6			
57.422	2	5	639.26	$P_1$13			
57.450	7	10	639.08	$P_1$13		$P_3$13	
57.506	4	8	638.75		$P_2$13		
57.563	1	5	638.40				$R_1$24
57.607	10	5	638.13	$P_1$3			
57.631		2c	637.99				$R_1$24
57.770	5	7	637.14	$P_1$12			
57.796	4	5	636.97	$P_1$12			
57.903	10b	6	636.34	$P_1$4	$P_2$2		
57.949	4	7	636.06		$P_2$12		
57.980	4	8	635.87			$P_3$12	
58.040	5	5	635.50	$P_1$11			
58.070	7	7	635.32	$P_1$11			
58.134	10b	6	634.94	$P_1$5			
58.237	8	6	634.31	$P_1$10			
58.266	9	4	634.13	$P_1$10	$P_2$3		
58.302	10b	8	633.92	$P_1$6	$P_2$11		
58.346		3	633.65				$R_1$23
58.356	7		633.58	$P_1$9			
58.385	10	6	633.41	$P_1$7	$P_1$9]		
58.406	10c		633.28	$P_1$8			
58.427	10c	9	633.16	$P_1$8		$P_3$11	
58.549	10	6	632.41		$P_2$4		
58.586	9	7	632.19		$P_2$10		
58.754	10	7	631.17		$P_2$5		
58.786	10	10c	630.97		$P_2$9	$P_3$10	
58.888	10b	9	630.36	[$P_2$8	$P_2$6	$P_3$3	
58.934	10	7	630.08		$P_2$7		
59.064	10	9	629.29			$P_3$9	
59.081		7c	629.19				$R_3$22
59.155	10	5	628.74			$P_3$4	
59.258	10	8	628.11			$P_3$8	
59.318	10	6	627.75			$P_3$5	
59.370	10	8	627.45			$P_3$7	
59.390	10c	8c	627.31			$P_3$6	
59.729	2	3	625.26				$R_1$23
59.805		4	624.80				$R_1$23
60.064		3	623.10				
60.153	1	2	622.69				
60.231	2	1	622.21				
60.494	2	3	620.62				
60.544		6	620.31				$R_2$22
60.976		4	617.69				
61.293		7	615.77				$R_3$21
61.485	2		614.61				
61.563	2		614.13				
61.827		6	612.54				$R_1$22
61.900		2	612.09				$R_1$22

λ	I	I_2	ν	Classification 0-3			4-8		
4062.279	1		24 609.80		$Q_{23}5$				
62.350	2		609.37		$Q_{23}5$				
62.444	1		608.80		$Q_{23}4$				
62.563	2		608.08		$Q_{23}3$				
62.635	0		607.64		$Q_{23}2$				
62.666		7	607.45					$R_2 21$	
63.167	2		604.41						
63.449		7	602.71						$R_3 20$
63.474	2		602.56						
63.526		2	602.25						
63.604		3	601.78						
63.853		4	600.27				$R_1 21$		
63.928		5	599.81				$R_1 21$		
63.979		3	599.50						
64.307	2		597.52						
64.454		3	596.63						
64.738		6	594.91					$R_2 20$	
65.536		7	590.08						$R_3 19$
65.816		6	588.39				$R_1 20$		
65.888		3	587.96				$R_1 20$		
66.730		6	582.86					$R_2 19$	
66.746		3c	582.77					$R_2 19$	
67.279		1	579.54						
67.355		1	579.09						
67.565		7	577.82						$R_3 18$
67.609		1	577.55						
67.657		1	577.27						
67.697		4	577.03				$R_1 19$		
67.734		1	576.80						
67.770		5	576.58				$R_1 19$		
67.810		1	576.34						
67.851		3	576.09						
68.658		4	571.22					$R_2 18$	
68.674		6c	571.12					$R_2 18$	
68.727		1	570.80						
69.036		1	568.94						
69.193		1	567.99						
69.301		1d	567.34						
69.395		2	566.77						
69.436		1	566.52						
69.525		10	565.98				$R_1 18$		$R_3 17$
69.576		2	565.68				$R_1 18$		
70.224		2	561.76						
70.301		2	561.29						
70.410		1	560.64						
70.526		6	559.94					$R_2 17$	
70.544		3c	559.83					$R_2 17$	
70.647		1	559.21						
70.700		2	558.89						
70.815		1	558.20						
71.195		3	555.91						
71.237		1	555.65						
71.280		3	555.40				$R_1 17$		
71.332		1	555.08						
71.383		5	554.77				$R_1 17$		

λ	I	I_2	ν	Classification 4-8			3-7
4071.428		6	24 554.50			$R_3$16	
72.321		4	549.12		$R_2$16		
72.347		5	548.96		$R_2$16		
72.956		6	545.29	$R_1$16			
73.008		1	544.98				
73.052		3	544.71	$R_1$16			
73.186		1	543.91				
73.253		7	543.50			$R_3$15	
73.461		4	542.25				$R_1$34
73.544		2	541.75				$R_1$34
73.932		4	539.41				$R_2$33
74.046		6	538.72		$R_2$15		
74.079		3	538.52		$R_2$15		
74.397		0	536.61				$R_1$32
74.456		5	536.25				
74.563		3	535.61	$R_1$15			
74.614		1	535.30				
74.656		5	535.05	$R_1$15			
75.021		7	532.85			$R_3$14	
75.740		5	528.52		$R_2$14		
75.767		4	528.36		$R_2$14		
76.094		6	526.39	$R_1$14			
76.117		4	526.26	$R_1$14			
76.187		3	525.84				
76.403		1	524.53				
76.590		2	523.41				
76.632		2	523.16		$P_2$29		$R_1$33
76.691		3	522.80				
76.718		7	522.64			$R_3$13	
77.118		2	520.23			$P_3$28	
77.145		4c	520.07			$P_3$28	
77.316		6	519.04		$R_2$13		
77.340		5	518.90		$R_2$13		
77.553		5	517.62	$R_1$13			
77.572		4	517.50				
77.605		1c	517.30				
77.651		8	517.03	$R_1$13			
78.131		2	514.14		$P_2$28		
78.355		7	512.80			$R_3$12	
78.733		5	510.52			$P_3$27	
78.830		3	509.94		$R_2$12		
78.853		5	509.80		$R_2$12		
78.899		1	509.53				
78.952		7	509.21	$R_1$12			
79.000		2	508.92				
79.035		3	508.71	$R_1$12			
79.560		6	505.56		$P_2$27		
79.723		5	504.58	$P_1$27			$R_1$32
79.784		3	504.21	$P_1$27			
79.806		2	504.08				
79.916		2	503.42			$R_3$11	
79.935		5c	503.30				
80.181		5	501.83			$P_3$26	
80.226		4	501.56				
80.255	1	4	501.38				$R_2$31

λ	I	I_2	ν	Classification 4-8			3-7
4080.280	2	4c	24 501.23	$R_1$11	$R_2$11		
80.308	1	4	501.06		$R_2$11		
80.352	2	5	500.80	$R_1$11			
80.773		5	:98.27				
80.931		5	497.32		$P_2$26		
81.415	3	6	494.42			$R_3$10	
81.464	1	2	494.12				
81.508	3	3	493.86	$R_1$10			
81.563		5	493.53			$P_3$25	
81.586	2	5	493.39	$R_1$10			
81.651	2	4	493.00		$R_2$10		
81.682	3	5	492.82		$R_2$10		
82.242		7	489.46		$P_2$25		
82.665	3	3	486.92	$R_1$9			
82.707	1	1	486.67				
82.753	4	7	486.39	$R_1$9			
82.821		5	485.98	$P_1$28			
82.841	4	7c	485.86			$R_3$9	
82.888	0	7	485.59	$P_1$25		$P_3$24	
82.957	4	4	485.17		$R_2$9		
82.989	2	2	484.97		$R_2$9		
83.269	0	2	483.30				$R_2$30
83.299		4	483.12				$R_2$30
83.492		6	481.96		$P_2$24		
83.753	6	6	480.39	$R_1$8			
83.830	1	6	479.93				
83.842	3		479.86	$R_1$8			
83.972	0	6	479.08	$P_1$24			
84.033		2	478.72	$P_1$24			
84.146	1	6	478.06			$P_3$23	
84.190	2	3	477.79		$R_2$8		
84.211	6	6c	477.65		$R_2$8	$R_3$8	
84.664	0	6	474.94		$P_2$23		
84.770	4	2	474.30	$R_1$7			
84.808	0	1	474.07				
84.827	1		473.96				
84.858	7	4	473.77	$R_1$7			
85.056		4	472.59	$P_1$23			
85.085	0	1	472.41				
85.119		5	472.21	$P_1$23			
85.345	6	8	470.85		$R_2$7	$P_3$22	
85.373	3	2	470.68		$R_2$7		
85.497	6	6	469.94			$R_3$7	
85.677	1	5	468.87				$R_1$30
85.720	7	5	468.61	$R_1$6			
85.760	1		468.37				
85.774		7	468.29		$P_2$22		
85.803	4		468.11	$R_1$6			
86.068		6	466.53	$P_1$22			
86.131		3	466.15	$P_1$22			
86.228	0	5	465.57				$R_2$29
86.265		2	465.35				$R_2$29
86.425	4	1	464.39		$R_2$6		
86.455	6		464.21		$R_2$6		
86.465		8	464.15			$P_3$21	

λ	I	I_2	ν	Classification 4-8			3-7
4086.599	5	2	24 463.34	$R_1$5			
86.638	1	1	463.11				
86.677	7	4	462.88	$R_1$5			
86.721	7	6	462.61			$R_3$6	
86.798		7	462.15				$R_3$28
86.812		9c	462.07		$P_2$21		
87.004		4	460.91	$P_1$21			
87.027		2c	460.78				
87.068		5	460.54	$P_1$21			
87.172		2	459.92				
87.408	8	3	458.50		$R_2$5		
87.430	7	5c	458.37	$R_1$4	$R_2$5		
87.457	3		458.21				
87.484	5	1	458.04	$R_1$4			
87.520	0	8	457.82			$P_3$20	
87.788		7	456.23		$P_2$20		
87.870	8	6	455.74	$P_1$20		$R_3$5	
87.885		7c	455.65				
87.926		4	455.41	$P_1$20			
88.078	1	1	454.50			$Q_3$10	
88.158	4	2	454.02	$R_1$3			
88.191	1		453.82				
88.227	7	3	453.62	$R_1$3			
88.356	5	2	452.83		$R_2$4		
88.381	7	3c	452.68		$R_2$4		
88.509		8	451.92			$P_3$19	
88.685		9	450.86	$P_1$19	$P_2$19		
88.779	1	6	450.30	$P_1$19			
88.843	7	2	449.92	$R_1$2			
88.874	1	1	449.73				
88.907	4	2	449.54	$R_1$2			
88.944	8	6	449.31		[$Q_3$9	$R_3$4	
88.992		2	449.02				
89.119	0	2	448.27				$R_2$28
89.156		4	448.05				$R_2$28
89.213	8	4	447.71		$R_2$3		
89.229	4c	2c	447.61		$R_2$3		
89.406	1d	7	446.55	$P_1$18			
89.427		8c	446.43			$P_3$18	
89.468	4	1	446.18	$R_1$1			
89.494	1	4	446.03	$P_1$18			
89.522	6	7c	445.85	$R_1$1	$P_2$18		
89.720	1	7	444.68			$Q_3$8	
89.944	9	4	443.34			$R_3$3	
89.988	4		443.07		$R_2$2		
90.001	7c	4	443.00		$R_2$2		
90.037	3	1	442.78	$R_1$0			
90.062		5	442.62	$P_1$17			
90.086	2		442.49	$R_1$0			
90.138	1	6	442.18	$P_1$17			
90.257		8	441.47				
90.267	2		441.41				
90.277		9c	441.35		$P_2$17	$P_3$17	
90.432	2	2	440.42			$Q_3$7	
90.551	0	2	439.71				

λ	I	I_2	ν	Classification 4-8			3-7
4090.646	1	7	24 439.14	$P_1$16			
90.693	6	1	438.86		$R_2$1		
90.721		4	438.70	$P_1$16			
90.769	1	2	438.40		$Q_2$5		
90.858	7	3	437.88		$Q_2$5	$R_3$2	
90.966	1	7	437.23		$P_2$16		
91.012	2	4	436.95	$P_1$1			
91.057	6	8	436.69	$P_1$1	[$P_2$16	$Q_3$6	
91.153	2	4	436.12	$P_1$15	$Q_2$4		
91.194		1	435.87		$Q_2$4		
91.228	2	6	435.67	$P_1$15			
91.278	0	1	435.36				$R_1$28
91.335		5	435.03				$R_1$28
91.423	6	2	434.50	$P_1$2	$Q_2$3		
91.465	5	3	434.25	$P_1$2	$Q_2$3		
91.582	4	9	433.55	$P_1$14	$P_2$15		
91.614	4		433.36			$Q_3$5	
91.663	4	4	433.07	$P_1$14	$Q_2$2		
91.761	1	8	432.48			$P_3$15	
91.778	5		432.38	$P_1$3			
91.815	7	3	432.16		$Q_2$1		
91.825	8c		4[illegible].10	$P_1$3			
91.928		2	431.49				$R_1$27
91.947	2	5c	431.37				$R_2$27
91.984	1	2	431.15				
92.021	4	5	430.93				
92.080	10	4	430.58	$P_1$4		$Q_3$4	
92.120	6	8	430.34	$P_1$4	$P_2$14		
92.210	1	8	429.80				
92.248	4	6	429.56	$P_1$12			
92.309	2	4	429.23	$P_1$12			
92.322	6		429.13	$P_1$5			
92.372	9	3	428.83	$P_1$5			
92.399	2	7	428.67			$P_3$14	
92.463	8	6	428.29	$P_1$11		$Q_3$3	
92.505	8	4	428.04				$R_3$26
92.531	5	6	427.89	$P_1$6	$P_1$11]		
92.568	5	5	427.67	$P_1$6			
92.577	3c		427.61		$P_2$13		
92.600	6	5c	427.47	$P_1$10	$P_2$13		
92.629	5	2	427.30	$P_1$7			
92.663	2		427.10	$P_1$10			
92.684	10	8	426.97	$P_1$7	$P_1$8]	$P_1$9]	
92.747	9	7	426.60	$P_1$8	$P_1$9]		
92.760	9c		426.52			$Q_3$2	
92.785	6	2	426.37		$P_2$2		
92.627	2	3	426.12				
92.964	2	7	425.30		$P_2$12	$P_3$13	
92.980	5c	9c	425.20		$P_2$12		
93.109		2	424.44				
93.139	9	4	424.26		$P_2$3		
93.291	6	7	423.35		$P_2$11		
93.420	9	4	422.58		$P_2$4		
93.452	4	7	422.39			$P_3$12	
93.527	2		421.94		$P_2$10		

λ	I	I_s	ν	Classification 4-8			3-7		
4093.541	6c	7	24 421.86		$P_2 10$				
93.596	1	2	421.52						
93.627	9	4	421.35		$P_2 5$				
93.710	7	6	420.85		$P_2 9$				
93.762	9	5	420.54		$P_2 6$				
93.803	8	6	420.30	[$P_2 8$	$P_2 7$				
93.819	8c	6c	420.20						
93.867	5	7	419.91			$P_3 11$			
93.935	0	2	419.51						
94.178	0	5	418.06				$R_1 27$		
94.371	6	3	416.91			$P_3 3$			
94.478	7	7	416.27			$P_3 9$			
94.532	1	3	415.95						
94.610	9	4	415.49			$P_3 4$			
94.669	9	6	415.13			$P_3 8$			
94.726	1	5	414.79					$R_2 26$	
94.751	9	3	414.64			$P_3 5$			
94.781	8	5	414.46			$P_3 7$			
94.810	9	5	4.4.29			$P_3 6$			
95.138		3	412.34						
95.243		4	411.71						
95.316		5	411.28						$R_3 25$
95.466		2	410.38				$P_1 41$		
95.529		3	410.01				$P_1 41$		
95.842	0	3c	408.14					$P_2 40$	
96.256		3	405.67						$P_3 39$
95.378		2	404.94						
96.815		8	402.34				$R_1 26$		
97.401		3	398.85					$R_2 25$	
97.424		6c	398.72					$R_2 25$	
97.621		2	397.54						
97.577		2	397.21						
97.764		3	396.69						
98.006		3	395.25				$P_1 40$		
98.042		6	395.04						$R_3 24$
98.085		2	394.78				$P_1 40$		
98.443		3	392.65					$P_2 39$	
98.884		5	390.02						$P_3 38$
99.214		2	388.06						
99.357		3	387.21				$R_1 25$		
99.399		5	386.96				$R_1 25$		
99.559		2	386.02						
99.620		2	385.65						
99.953		2	383.67	*				$R_2 24$	
.998		8	383.40					$R_2 24$	
4100.244		2	381.94						
00.625		8	379.73						$R_3 23$
00.698		2	379.24						
01.022		3	377.31					$P_2 38$	
01.464		4	374.69						$P_3 37$
01.571		2	374.05						
01.839		7	372.46				$R_1 24$		
01.891		3	372.15				$R_1 24$		
02.513		8	368.45					$R_2 23$	
02.706		2	367.31						

*N I line 4099.951

λ	I	I_2	ν	Classification 3-7		
4102.783		2	24 366.85			
02.891		3	366.21			
02.956		2c	365.82			
03.166		8	364.58			$R_3$22
03.251		2	364.07			
03.481		2	362.71			
03.651		3	361.70			
03.935		3	360.01			
04.257		4	358.10	$R_1$23		
04.314		5	357.76	$R_1$23		
04.963		7	353.91		$R_2$22	
05.203		2	352.49			
05.267		3	352.11			
05.497		2	350.74	$P_1$37		
05.570		3	350.31	$P_1$37		
05.625		7	349.98			$R_3$21
05.873		1	348.51		$P_2$36	
05.909		2	348.30		$P_2$36	
06.355		2	345.66			$P_3$35
06.589		7	344.27	$R_1$22		
06.648		3	343.92	$R_1$22		
06.832		3	342.83			
07.176		2	340.79			
07.203		1c	340.63			
07.321		7	339.93		$R_2$21	
07.339		5c	339.82		$R_2$21	
07.601		3	338.27			
07.714		3	337.60			
07.803		4	337.07	$P_1$36		
07.839		2	336.86			
07.882		1	336.61	$P_1$36		
08.016		8	335.81			$R_3$20
08.214		4	334.64		$P_2$35	
08.242		2c	334.47		$P_2$35	
08.685		5	331.85			$P_3$34
08.773		2	331.33			
08.815		4	331.08			
08.845		3	330.90	$R_1$21		
08.908		5	330.53	$R_1$21		
09.087		2	329.47			
09.624		7	326.29		$R_2$20	
09.958	6	4	324.31	*		
10.042		3	323.80	$P_1$35		
10.121		4	323.35	$P_1$35		
10.253		2	322.57			
10.325		7	322.14			$R_3$19
10.459		2	321.35		$P_2$34	
10.490		4	321.17		$P_2$34	
10.693		2	319.96			
10.753	00	3	319.61			
10.947		4	318.45			$P_3$33
11.026		5	317.99	$R_1$20		
11.081		4	317.67	$R_1$20		
11.487		3	315.27			
11.784	1	1	313.51			
4111.632		3	24 313.23		$R_2$19	
11.895		1	312.85			
12.099		2	311.65			
12.173		3	311.21			
12.202		5c	311.04	$P_1$34		
12.253		1	310.74			
12.283		2	310.56	$P_1$34		
12.470		3	309.45			
12.563		5	308.91			$R_3$18
12.607		3	308.64			
12.634		4c	308.48			
12.662		2c	308.32			
13.124		6	305.59	$R_1$19		
13.185		3	[illegible]	$R_1$19		
13.697	2		302.20			
13.809		2	301.54			
13.962		4	300.64		$R_2$18	
13.983		4c	300.51		$R_2$18	
14.291		2	298.70	$P_1$33		
14.373		4	298.21	$P_1$33		
14.478		3	297.59			
14.696	0d	3	293.30			
14.733		3	296.08		$P_2$32	
14.761		4	295.92		$P_2$32	$R_3$17
14.845		3	295.42			
15.051	4	3	294.21			
15.145		2	293.65	$R_1$18		
15.187		1	293.40			
15.237		4	293.11			$P_3$31
15.289		3	292.80			
15.395		4	292.18			
15.811	2		289.72			
16.280		4	286.95	$P_1$32		
16.373	0	2	286.41	$P_1$32		
16.549		2	285.37			
16.747		4	284.20		$P_2$31	
16.778		2	284.02		$P_2$31	
16.814	2		283.80			
16.937		2	283.08			
17.045		3	282.44			
17.060	2		282.35			
17.088		1	262.19	$R_1$17		
17.133	0		281.92			
17.159		1	281.77	$R_1$17		
17.202		3	281.51			
17.260		5	281.17			$P_3$30
18.003		2	276.79		$R_2$16	
18.032		4	276.62		$R_2$16	
18.074		2	276.37			
18.162		2	275.86	$P_1$31		
18.233		3	275.44	$P_1$31		
18.432	0	4	274.26			
18.593		3	273.31			
18.686		2	272.76		$P_2$30	
18.723		3	272.55		$P_2$30	

*N I line 4109.959

λ	I	I_2	ν	Classification 3-7 (a)	Classification 3-7 (b)	Classification 3-7 (c)
4118.629		3	24 271.92			$R_3$15
18.942		6	271.26	$R_1$16		
19.017		5	270.82	$R_1$16		
19.222		5	269.61			$P_3$29
19.424		3	268.42			
19.875		3	265.76		$R_2$15	
19.922		0	265.48			
19.968		0	265.21			
20.010		3	264.97			
20.040		6	264.79	$P_1$30		
20.088		1	264.51			
20.128		1	264.27			
20.158	0d	3	264.09			
20.544		4	261.82			
20.596	0	3	261.51		$P_2$29	
20.715	0	4	260.81	$R_1$15		
20.765		8	260.52			$R_3$14
20.782	1	8c	260.41	$R_1$15		
21.075		4	258.69			$P_3$28
21.108		3	258.50			
21.282		4	257.48			
21.344	0	2	257.11			
21.431		3	256.60			
21.601		4	255.60			
21.729		4	254.65		$R_2$14	
21.770		6	254.60		$R_2$14	
21.822		4	254.30			
21.883		2	253.94	$P_1$29		
21.925		5	253.69	$P_1$29		
22.180		3	252.19			
22.215		3	251.99			
22.241		2	251.83			
22.375		5	251.04		$P_2$28	
22.410	1	6	250.84	$R_1$14		
22.478	1	4	250.43	$R_1$14		
22.600		2	249.72			
22.622	1	5c	249.59			$R_3$13
22.673		4	249.29			
22.815		3	248.46			
22.845	0	2	248.28			
22.893		5	248.00			$P_3$27
23.471	2	6	244.60		$R_2$13	
23.505		5	244.40		$R_2$13	
23.554		2	244.11	$P_1$28		
23.611	0	7	243.78	$P_1$28		
23.733		2	243.06			
23.947		4	241.80			
24.023	1	4	241.37	$R_1$13		
24.085	3	7	240.98	$R_1$13		
24.109		6c	240.85		$P_2$27	
24.403	2	8	239.12			$R_3$12
24.608		2	237.92			$P_3$26
24.641		5	237.72			
25.135	2	4	234.82		$R_2$12	
25.170	3	6	234.61	$P_1$27	$R_2$12	

λ	I	I_2	ν	Classification 3-7 (a)	Classification 3-7 (b)	Classification 3-7 (c)
4125.222		5	24 234.31	$P_1$27		
25.546	4	8	232.40	$R_1$12		
25.620	2	7	231.97	$R_1$12		
25.709		8	231.45		$P_2$26	
25.809		4	230.86			
26.024		4	229.60			
26.061	1d	3	229.38			
26.103	4	8	229.13			$R_3$11
26.251		9	228.26			$P_3$25
26.418		3	237.29			
26.710		9	225.57	$P_1$26		
26.718	5		225.52		$R_2$11	
26.750	2	6	225.33	$P_1$26	$R_2$11	
26.989	3	5	223.93	$R_1$11		
27.061	6	7	223.51	$R_1$11		
27.248		8	222.41		$P_2$25	
27.584	1d	2	220.44			
27.658		2	220.01			
27.731	6	9	219.58			$R_3$10
27.207		8	219.13			$P_3$24
27.849		2	218.89			
27.963		2	218.22			
28.046	0	2	217.73			
28.153		4	217.10	$P_1$25		
28.200		6	216.83	$P_1$25		
28.218	4	5c	216.72		$R_2$10	
28.252	6	5	216.52		$R_2$10	
28.349	6	6	215.95	$R_1$10		
28.421	4	3	215.53	$R_1$10		
28.694		2	213.93			
28.721	1	9c	213.77		$P_2$24	
28.864		2	212.93			
29.282	8	10	210.49		[$P_3$23	$R_3$9
29.515		8	209.12	$P_1$24		
29.568		3	208.80	$P_1$24		
29.634	8	9	208.41	$R_1$9	$R_2$9	
29.672	4	2	208.19		$R_2$9	
29.698	8	5	208.04	$R_1$9		
29.754	1	2	207.71			
29.833		3	207.25			
30.098		8	205.70		$P_2$23	
30.684	1	8	202.26			$P_3$22
30.750	9	7	201.87			$R_3$8
30.790	1	2	201.64	$P_1$23		
30.828	9	4	204.42	$R_1$8		
30.849		4c	201.30	$P_1$23		
30.894	7	4	201.03	$R_1$8		
30.977	6	4	200.54		$R_2$8	
31.012	8	6	200.35		$R_2$8	
31.407		7	198.03		$P_2$22	
31.558		2	197.14			
31.768		3	195.91			
31.945	8	3	194.87	$R_1$7		
32.002		10	194.55	$P_1$22		$P_3$21
32.013	9		194.48	$R_1$7		

λ	I	I_z	ν	Classification 3-7		
4132.051	0	3	24 194.26	$P_1$22		
32.137	10	7	193.75			$R_3$7
32.228	10	5	193.22		$R_2$7	
32.261	8	4	193.03		$R_2$7	
32.319	0	2	192.69			
32.507		2	191.59			
32.623		5	190.91		$P_2$21	
32.687	1	3	190.53			
32.720		2	190.34			
32.831		2c	189.69			
32.927	1	2	189.13			
32.982	10	6	188.80	$R_1$6		
32.045	9	4	188.44	$R_1$6		
33.116		3	188.02	$P_1$21		
33.172		6	187.69	$P_1$21		
33.204		2	187.51			
33.232	0	5	187.35			$P_3$20
33.400	8	2	186.36		$R_2$6	
33.430	10	7	186.18		$R_2$6	
33.451	10	7c	186.06			$R_3$6
33.659	0	4	184.84			
33.753	0	3	184.29		$P_2$20	
33.773		7c	184.18		$P_2$20	
33.941	9	3	183.20	$R_1$5		
33.997	10	5	182.87	$R_1$5		
34.054		2	182.53	$P_1$20		
34.153		2	181.95	$P_1$20		
34.213		1	181.61			
34.385	1	2	180.60			$P_3$19
34.422		2c	180.38			
34.485	9	5	180.01		$R_2$5	
34.515	8	2	179.84		$R_2$5	
34.681	10	6	178.87			$R_3$5
34.822	10	4	178.04	$R_1$4		
34.876	9	2	177.74	$R_1$4		
35.117		1	176.32	$P_1$19		
35.157	1	3	176.08	$P_1$19		
35.262		3	175.47			
35.365		2	174.87			
35.484	9	5	174.17		$R_2$4	
35.507	10	5c	174.04		$R_2$4	
35.565		2	173.70			
35.634	9	2	173.30	$R_1$3		
35.657		4c	173.17			
35.676	10	5	173.05	$R_1$3		
35.735		2	172.70			
35.823	10	8	172.19			$R_3$4
35.957		2	171.41			
35.987		7	171.23	$P_1$18		
36.040		6	170.93	$P_1$18		
36.130		3	170.40			
36.208		4	169.94			
36.314	1	3	169.32			
36.370	10	3	168.99	$R_1$2		
36.403	10	4	168.80	$R_1$2	$R_2$3	
4136.415	10c		24 168.73		$R_2$3	
36.465	1	3	168.44			$P_3$17
36.525	1	1	168.09			$Q_3$8
36.582		4	167.76			
36.699	0	3	167.07		$P_2$17	
36.719		2c	166.96		$P_2$17	
36.774	1	5	166.63	$P_1$17		
36.828	2	6	166.32	$P_1$17		
36.886	10	4	165.99			$R_3$3
37.038	6	5	165.09	$R_1$1		
37.072	9	2	164.89	$R_1$1		
37.231	8	3	163.97		$R_2$2	
37.245	10c		163.88		$R_2$2	
37.286		5	163.65			
37.299	3		163.57			$Q_3$7
37.326		4	163.41	*		
37.381	1	5	163.09			$P_3$16
37.426	1	2	162.83			
37.478	2	6	162.53	$P_1$16		
37.517		6	162.30		$P_2$16	
37.531	3	8c	162.21	$P_1$16	$P_2$16	
37.649	8	2	161.53	$R_1$0		
37.675	4		161.37	$R_1$0		
37.750		2	160.94			
37.852	10	4	160.34			$R_3$2
37.892		2	160.10			
37.986	10	4	159.56		$R_2$1	$Q_3$6
38.066	2		159.09		$Q_2$5	
38.104	2	5	158.87	$P_1$15		
38.155	4	8	158.57	$P_1$15		
38.207	1	5	158.27			$P_3$15
38.247	3	6	158.04		$P_2$15	
38.267	2c	5c	157.92		$P_2$15	
38.409	3		157.09		$Q_2$4	
38.464	2		156.77		$Q_2$4	
38.594	8	2	156.01			$Q_3$5
38.643	4	7	155.72	$P_1$14		
38.664	3		155.60	$P_1$1		
38.694	8	5	155.43	$P_1$1	$P_1$14]	
38.744	3		155.13		$Q_2$3	
38.759		4	155.05			
38.776	4		154.95		$Q_2$3	
38.824	1	4	154.67			
38.855	1	2	154.48			
38.894	2	5	154.26		$P_2$14	
38.915	5c	6c	154.14		$P_2$14	
38.958	4	7	153.88			$P_3$14
38.989	6	1	153.70		$Q_2$2	
39.003	3c		153.62		$Q_2$2	
39.019		2	153.53			
39.078	9	2	153.18	$P_1$2		
39.104	10	6	153.03	$P_1$2	$P_1$13]	$Q_3$4
39.152	10	7	152.75	$P_1$13	$Q_2$1	
39.235	0	3	152.27			
39.313		4	151.81			

*N I line 4137.83?

λ	I	I_2	ν	Classification 3-7		
4139.313	1d	3	24 151.42			
39.434	8	2	151.11	$P_{1}3$		
39.460	9	9	150.96	$P_{1}3$		
39.482	8	9c	150.83	$P_{1}12$	$P_{2}13$	
39.523	10	5	150.59	$P_{1}12$		$Q_{3}3$
39.587	1	2	150.21			
39.622	5	8	150.01			$P_{3}13$
39.725	10	5	149.41	$P_{1}4$		
39.752	7	1	149.25	$P_{1}4$		
39.760	5	4	149.09	$P_{1}11$		
39.806		3	148.94			
39.828	9	8	148.81	$P_{1}11$		
39.837	10c		148.75			$Q_{3}2$
39.881	2	2	148.50			
39.918	1	2	148.28			
39.946	9	6	148.12	$P_{1}5$	$P_{2}12$	
39.966		7c	148.01		$P_{2}12$	
39.977	9		147.94	$P_{1}5$		
39.998	9	6	147.82	$P_{1}10$		
40.040	8	4	147.57	$P_{1}10$		
40.070	2		147.40			
40.101	10	5	147.22	$P_{1}6$		
40.136	9	5	147.01	$P_{1}6$	$P_{1}9$]	
40.165	8		146.84			
40.182		8	146.75		$P_{2}2$	
40.187	10c		146.71	$P_{1}7$		$P_{3}12$
40.208		9c	146.59	$P_{1}8$		
40.225	10c	4c	146.49	$P_{1}7$		
40.241	9c		146.40	$P_{1}8$		
40.347	8	7	145.78		$P_{2}11$	
40.361	6c		145.70		$P_{2}11$	
40.395	1	2	145.50			
40.427		7	145.32			
40.517	10	4	144.79		$P_{2}3$	
40.553		3	144.58			
40.615	1	3	144.22			
40.666	7	8	143.92		$P_{2}10$	
40.678	8c		143.85		$P_{2}10$	
40.709	8	10	143.67			$P_{3}11$
40.762	2	5	143.36			
40.788	10	6	143.21		$P_{2}4$	
40.897	9	7	142.58		$P_{3}9$	
40.909	8c		142.50		$P_{2}9$	
40.976	10	6	142.12		$P_{2}5$	
41.009	2	1	141.92			
41.046	9	7	141.70		$P_{2}8$	
41.085	10	7	141.48		$P_{2}6$	
41.101	10c	8c	141.38		$P_{2}7$	
41.124	10c		141.25			$P_{3}10$
41.452	10		139.34			$P_{3}9$
41.507	10		139.02			$P_{3}3$
41.697	10		137.91			$P_{3}8$
41.743	10		137.64			$P_{3}4$
41.846	10		137.04			$P_{3}7$
41.876	10		136.87			$P_{3}5$

λ	I	ν	Classification 3-7		
4141.910	10	24 136.67			$P_{3}6$
43.440	7	127.76	*		
51.491	9	080.97			
59.257	2	036.00			
				1-7	
4878.946	2d	20 490.53			
79.990	2	486.14			
80.747	0	482.96	$R_{1}17$		
80.814	1	482.68	$R_{1}17$		
81.319	1bd	480.56			
81.729	1	478.84			
82.113	1	477.23			
82.506	1	475.59			
82.[illegible]	2d	474.10			$R_{3}15$
83.799	2	470.16	$R_{1}16$		
83.878	1	469.83	$R_{1}16$		
84.972	2	465.25		$R_{2}15$	
86.010	2	460.90			$R_{3}14$
86.705	2	457.99	$R_{1}15$		
86.792	2	457.63	$R_{1}15$		
87.944	1	452.80		$R_{2}14$	
87.991	2	452.61		$R_{2}14$	
89.004	3	448.37			$R_{3}13$
89.485	2	446.36	$R_{1}14$		
89.565	1	446.02	$R_{1}14$		
90.596	1d	441.71			
90.779	2	440.95		$R_{2}13$	
90.827	1	440.75		$R_{2}13$	
91.955	3	436.04			$R_{3}12$
92.121	2	435.34	$R_{1}13$		
92.198	4	435.02	$R_{1}13$		
92.506	1	433.73			
93.412	2	429.95			
93.471	1	429.70		$R_{2}12$	
93.521	3	429.50		$R_{2}12$	
94.611	5	424.95	$R_{1}12$		
94.664	5	424.72			$R_{3}11$
94.697	4	424.59	$R_{1}12$		
96.029	5	419.03		$R_{2}11$	
96.078	2	418.82		$R_{2}11$	
96.961	3	415.14	$R_{1}11$		
97.042	6	414.81	$R_{1}11$		
97.274	5	413.84			$R_{3}10$
98.450	2	408.94		$R_{2}10$	
98.500	6	408.73		$R_{2}10$	
99.171	7	405.93	$R_{1}10$		
99.252	4	405.60	$R_{1}10$		
99.745	8	403.54			$R_{3}9$
4900.727	7	399.46		$R_{2}9$	
00.776	4	399.25		$R_{2}9$	

*N I line 4151.46

λ	I	ν	Classification 1-7		
4901.242	5	20 397.31	$R_1$9		
01.320	9	396.99	$R_1$9		
02.685	9	393.79			$R_3$8
02.864	5	390.56		$R_2$8	
02.913	8	390.36		$R_2$8	
03.174	8	389.27	$R_1$8		
03.250	6	388.96	$R_1$8		
04.285	9	384.64			$R_3$7
04.859	8	382.27		$R_2$7	
04.906	5	382.08		$R_2$7	
04.967	6	381.82	$R_1$7		
05.037	9	381.53	$R_1$7		
05.182	0	380.93			
05.822	2	378.35			
06.103	1	377.10	$P_1$19		
06.157	2	376.88	$P_1$19		
06.281	2	376.36			
06.355	10	376.06			$R_3$6
06.484	2	375.52			
06.624	10	374.94	$R_1$6		
06.690	9	374.66	$R_1$6		
06.712	8	374.58		$R_2$6	
06.751	9	374.41		$R_2$6	
06.984	2	373.44			
07.136	3	372.80		$P_2$18	
07.215	3	372.48		$P_2$18	
07.349	1	371.93			
07.424	1	371.62			$Q_3$10
07.513	2	371.25			
07.665	3bd	370.60			$P_3$16
07.773	3	370.17	$P_1$18		
07.823	2	369.94	$P_1$18		
07.965	2bd	369.35			
08.153	7	368.59	$R_1$5		
08.204	9	368.38	$R_1$5		
08.272	9	368.10			$R_3$5
08.415	9	367.51		$R_2$5	
08.455	7	367.34		$R_2$5	
08.605	2	366.72		$P_2$17	
09.009	1	365.04			$Q_3$9
09.369	4	363.54	$P_1$17		$P_3$16
09.454	1	363.19			
09.541	9	362.84	$R_1$4		
09.594	7	362.62	$R_1$4		
09.973	7	361.03		$R_2$4	
10.012	9	360.88		$R_2$4	
10.051	9	360.72			$R_3$4
10.149	1	360.31		$P_2$16	
10.184	3	360.16		$P_2$16	
10.459	2	359.02			$Q_3$8
10.693	3	358.03	$P_1$16		
10.754	2	357.81	$P_1$16		
10.803	6	357.58	$R_1$3		
10.851	9	357.40	$R_1$3		
10.941	3	357.03			$P_3$15

λ	I	ν	Classification 1-7		
4911.392	9	20 355.17		$R_2$3	
11.422	6	355.04		$R_2$3	
11.484	1	354.77			
11.573	4	354.40		$P_2$15	
11.604	3	354.28		$P_2$15	
11.677	10	353.98		$R_2$3	
11.778	3	353.56			$Q_3$7
11.948	9	352.86	$R_1$2	$P_2$15]	
11.991	7	352.68	$R_1$2	$P_1$15]	
12.443	5	350.81			$P_3$14
12.587	1	350.21			
12.663	8	349.89		$R_2$2	$Q_3$6]
12.685	8	349.80		$R_2$2	
12.842	2	349.15		$P_2$14	
12.873	5	349.02		$P_2$14	
12.936	4	348.76			$Q_3$6
12.969	4	348.63	$R_1$1		
12.999	6	348.51	$R_1$1		
13.054	6	348.28	$P_1$14		
13.108	4	348.05	$P_1$14		
13.148	7	347.89			$R_3$2
13.523	1	346.33		$Q_2$5	
13.621	2	345.93		$Q_2$5	
13.699	7	345.61			$P_3$13
13.799	7	345.19		$R_2$1	
13.871	5	344.90	$R_1$0		
13.895	3	344.80	$R_1$0		
13.947	5	344.58		$P_2$13	$Q_3$5
13.978	5	344.45		$P_2$13	
14.017	4	344.29	$P_1$13		
14.075	7	344.05	$P_1$13		
14.167	1	343.67			
14.229	2	343.41		$Q_2$4	
14.306	1	343.09		$Q_2$4	
14.803	8	341.03		$Q_2$3	$Q_3$4
14.847	10	340.85	$P_1$12		$P_3$12
14.901	5	340.63	$P_1$12		
14.933	4	340.50			
14.961	4	340.37		$P_2$12	
14.992	7	340.26		$P_2$12	
15.217	4	339.32		$Q_2$2	
15.248	2c	339.19			
15.342	6	338.81	$P_1$1		

Table 11

Bands of the First Positive Group of N_2

The following wavelength regions are included

Range	Bands	Plates		Page
λ5099-5185*	21-16, 20-15, 19-14, 18-13	59P83a		69
5185-5243	17-12	59P83a		69
5243-5306*	16-11, 15-10, 14-9	59P83a		71
5515-5661*	8-3, 7-2, 16-12, 6-1, 15-11, 14-10	59P83b		71
5707-5885	12-8, 11-7, 10-6	59P57c		72
6146-6652	4-0, 12-9, 11-8, 10-7, 9-6, 8-5, 7-4, 6-3	59P57d	58P365d	86
6726-6903	4-1, 3-0	58P365e		129
7203-7544	6-4, 5-3, 4-2	58P365f		135
7628-7856#	2-0, 7-6	59P117c	58P365g	148
7856-8081	7-6, 6-5	58P365g		176
8790-8944	1-0	58P365i		181

All measurements are from first order plates with a dispersion of 1.2 Å/mm. All observed lines are given except in the intervals marked *. However in most cases very weak unclassified lines have been omitted. The intensities are eye estimates or from uncalibrated microphotometer traces.

The discharge conditions were: 200 mc discharge in N_2 at 0.01 mm pressure cooled by liquid nitrogen. In the region marked # measurements from an uncooled discharge at 1.0 mm pressure are included.

Both high and low temperature discharge
* Only the lines near the head listed for these bands

λ	I	ν	Classification		
5099.207	2	19 605.44			
99.453	2	604.50			
99.542	1	604.16	21-16	P_1	
5126.629	1	500.58			
26.754	1	500.10			
26.852	2	499.73			
27.028	1	499.09			
27.095	2	498.81	20-15	P_1	
54.924	2	393.54			
55.023	2	393.17			
55.100	4	392.88			
55.207	2	392.48			
55.296	2	392.14			
55.357	3	391.91	19-14	P_1	
83.840	4	285.36			
83.929	3	285.03			
83.991	7	284.80			
84.064	1	284.53			
84.135	3	284.27			
84.199	2	284.03			
84.252	6	283.83	18-13	P_1	
84.434	1	283.15			
86.203	1	276.58			
86.518	1d	275.41			
86.630	2	274.99			
87.017	1	273.55			
87.478	1	271.84			
87.635	1	271.26			
87.774	2d	270.74			
88.514	1	267.99			
89.333	1d	264.95			
89.641	1	263.81			
89.826	2	263.12			
90.043	1	262.31			
90.175	1	261.82			

λ	I	ν	Classification 17-12		
5190.408	1bd	19 260.96			
90.760	1	259.65			
90.915	2	259.08	$R_1$15		
91.407	1	257.25			
91.546	0	256.74			
91.685	1	256.22			
91.811	2	255.75			
91.984	1d	255.11			
92.457	1	253.36	$R_1$14		
92.620	0	252.75			
92.833	1d	251.97			
92.935	0	251.39			
93.205	1	250.59			
93.345	2	250.07			
93.503	0	249.48			
93.870	1	248.12			
93.962	3	247.78	$R_1$13		
94.134	1	247.14			
94.313	1	246.48			
94.506	2d	245.77			
94.734	1	244.92			
94.932	2	244.19		$Q_2$9	
95.190	1d	243.23			
95.349	1	242.64			
95.460	2	242.23	$R_1$12		
95.685	1	241.40			
95.977	2	240.32		$Q_2$7	
96.089	1	239.90			
96.217	1	239.43			
96.310	2	239.08		$R_2$7	
96.385	3	238.81			
96.477	1	238.46			
96.833	1	237.15			
96.911	3	236.86	$R_1$11		
97.068	0	236.28			

λ	I	ν	Classification 17-12		
5197.207	0	19 235.76			
97.357	1	235.21		$R_2 6$	
97.686	0	233.98			
97.939	1	233.05			
98.147	1	232.28			
98.257	2	231.88		$R_2 5$	
98.362	2	231.49	$R_2 10$		
98.645	0	230.44			
98.914	1	229.45			
99.136	2	228.63			
99.428	1	227.55			
99.618	1	226.84			
99.759	3	226.32	$R_1 9$		
99.862	1	225.94			
99.992	2	225.46			
5200.464	0	223.72			
00.753	1	222.65			
00.882	1	222.17			
01.013	0	221.69			
01.157	2	221.15	$R_1 8$		
01.278	1	220.71			
01.477	1	219.97			
01.602	2d	219.51			
01.954	0	218.21			
02.132	1	217.55			
02.269	1	[illegible]17.05			
02.405	1	216.54			
02.523	[illegible]	216.11	$R_1 7$		
02.5[illegible]	[illegible]	215.51		$Q_{23} 4$	
02.[illegible]9[illegible]	[illegible]	215.10			
[illegible]	2	214.75		$Q_{23} 3$	
0[illegible]	0	214.17		$Q_{23} 2$	
03.196	0	213.62			
03.328	1	213.13		$Q_{23} 1$	
03.544	1	212.34	$Q_1 14$		
03.664	0	211.89			
03.766	1	211.52			
03.890	2	211.06	$R_1 6$		
04.061	0	210.43			
04.243	0	209.76			
04.418	2d	209.11	$Q_1 13$		
04.656	2	208.23			
04.798	1	207.71			
04.901	0	207.33			
05.002	2	206.96			
05.111	1	206.55			
05.228	4	206.12	$Q_1 12$	$R_1 5]$	
05.352	1	205.66			
05.508	1	205.09			
05.707	0	204.35	$Q_{12} 11$		
05.893	1	203.67			
06.027	4	203.17	$Q_1 11$		
06.133	0	202.78			
06.251	0	202.35			
06.374	1	201.89			

λ	I	ν	Classification 17-12		
5206.480	1	19 201.50	$Q_{12} 10$		
06.566	2	201.19	$R_1 4$		
06.695	0	200.75			
06.811	2	200.28	$Q_1 10$		
06.905	3	199.94			
07.166	1	198.97			
07.267	2	198.60	$Q_{12} 9$		
07.395	1	198.13			
07.488	1	197.78			
07.565	3	197.50	$Q_1 9$		
07.622	2	197.29			
07.702	1	197.00			
07.796	1	196.65			
07.889	3	196.31	$R_1 3$		
08.018	1	195.83			
08.163	2	195.30			
08.302	3	194.79	$Q_1 8$		
08.527	1	193.96			
08.712	2	193.28	$Q_{12} 7$		
08.785	1	193.00			
08.906	1	192.56			
09.023	5	192.13	$Q_1 7$		
09.089	1	191.88			
09.201	1	191.47	$R_1 2$		
09.439	1	190.60	$Q_{12} 6$		
09.628	1	189.90			
09.723	2	189.55	$Q_1 6$		
09.906	0	188.88			
10.027	1	188.43			
10.123	2	188.08	$Q_{12} 5$		
10.317	1	187.36			
10.416	5	187.00	$Q_1 5$		
10.492	2	186.72	$R_1 1$		
10.665	1	186.08			
10.793	1	185.61	$Q_{12} 4$		
10.929	0	185.11			
11.034	1	184.72			
11.098	3	184.49	$Q_1 4$		
11.301	1	183.74			
11.494	2	183.03	$Q_{12} 3$		
11.578	1	182.72			
11.684	1	182.33			
11.767	4	182.02	$Q_1 3$	$R_1 0]$	
11.953	1	181.34			
12.079	0	180.88			
12.231	1	180.32			
12.423	2	179.61	$Q_1 2$		
12.547	1	179.15			
12.681	1	178.66			
12.775	1	178.31	$P_{12} 15$		
12.891	1	177.89			
13.008	5	177.46			
13.070	5	177.23	$Q_1 1$	$P_{12} 13]$	
13.175	3	176.84	$P_{12} 12$		
13.274	4	176.48	$P_{12} 11$		

*N I line 5201.63

λ	I	ν	Classification 17-12		
5213.355	4	19 176.18	P_{12}10		
13.427	5	175.92	P_{12}9		
13.493	[illegible]	175.67	P_{12}8		
13.557	8	175.44	P_{12}1-7	P_1 11]	
13.660	4	175.06	Q_1 0		
13.731	5	174.80	P_1 9		
13.823	8b	174.46	P_1		
13.989	0	173.85			
14.348	0	172.53			
14.639	0	171.46			
14.823	2	170.78	O_{12}1		
15.075	1	169.85			
15.473	1	168.39	O_{12}2		
15.960	1	166.60			
16.135	3	165.96	O_{12}3		
16.357	1	165.14			
16.553	2	164.42			
16.679	1	163.96			
16.801	2	163.51	O_{12}4		
17.276	1	161.77			
17.435	3	161.18	O_{12}5		
17.578	1	160.66			
17.836	1	159.71	O_{13}5		
17.964	0	159.24			
18.079	2	158.82	O_{12}6		
18.309	0	157.98			
18.453	0	157.45	C_{13}6		
18.590	1	156.98			
18.715	3	156.49	O_{12}7		
18.889	0	155.85			
19.067	1d	155.19	O_{13}7		
19.335	1	154.21	O_{12}8		
19.608	1	153.21			
19.758	1d	152.66			
19.934	2	152.01	O_{12}9		
20.084	1	151.46			
20.538	1bd	149.80	O_{12}10		
21.123	1	147.65	O_{12}11		
21.874	1bd	144.90			
22.228	1	143.60			
22.526	1	142.51			
25.265	1	132.47			
25.889	1bd	130.19			
26.363	1d	128.45			
26.557	1d	127.74			
26.732	2	127.10			
27.169	1	125.50			
27.279	1	125.10			
27.589	1	123.96			
27.740	2	123.41			
27.837	1	123.06			
27.952	1	122.64			
28.025	2bd	122.37			
28.109	1	122.07			
28.274	3	121.46			

λ	I	ν	Classification		
5228.383	3	19 121.06			
29.551	1	116.43			
32.484	1	106.07			
43.651	1	065.39			
43.733	2	065.09			
43.803	8	064.84			
43.959	1	064.27			
44.030	2	064.01			
44.090	6	063.80	16-11,	P_1	
44.221	1	063.32			
74.598	1	18 953.53			
74.713	1	953.12			
74.788	6	952.85	15-10,	P_1	
74.936	1	952.42			
75.013	2	952.04			
75.090	3	951.76			
75.217	1	951.31			
5306.356	1	840.09			
06.466	1	839.70			
06.540	4	839.44	14-9,	P_1	
06.699	1	838.88			
06.790	2	838.55			
06.870	2	838.27			
5515.352	4	126.19			
15.451	9	125.86			
15.540	6	125.57			
15.630	10b	125.27	8-3,	P_1	
53.378	10b	102.07			
53.509	5	101.65			
53.610	8	101.32			
53.709	9	101.00			
53.764	10	100.82	7-2,	P_1	
70.220	5	17 947.64			
70.281	4	947.45			
70.370	9	947.16			
70.436	4	946.95			
70.498	9	946.75			
70.553	9	946.57			
70.618	2	946.36			
70.701	5	946.09			
70.765	7	945.89			
70.815	9	945.72			
70.890	1	945.48			
70.961	8	945.26	16-12,	P_1	
92.247	3	876.95	6-1,	P_{12}1	
92.295	5	876.80	P_{12}2,3		
92.387	5	876.50			
92.471	6	876.23			
92.534	9	876.03	$P_1$1		
92.632	3	875.72	$P_1$3		
92.687	3	875.54			
92.744	3	875.36			
92.782	4	875.24			
92.853	8	875.01	$P_1$7		
92.909	8	874.83	$P_1$9		

λ	I	ν	Classification		
5615.034	7	17 804.46			
15.069	8	804.29			
15.166	2	803.98			
15.249	5	803.72			
15.306	3	803.54			
15.346	8	803.41	15-11,	P_1	
60.489	2	661.43			
60.532	5	661.30			
60.581	7	661.14			
60.687	3	660.81			
60.740	1	660.65			
60.807	4	660.44			
60.872	8	660.24	14-10,	P_1	
				12-8	
5707.130	2	17 513.09			
07.295	1	516.58			S_{32} 12
07.443	2	516.13			
09.686	1	509.25			S_{32} 11
09.863	0	508.71			T_{31} 7
11.963	1d	502.27			S_{32} 10
14.173	2	495.50			S_{32} 9
14.675	1	493.96		S_{21} 11	
14.892	1d	493.30			
15.438	1	491.63			T_{31} 5
15.915	1d	490.17			
16.272	1	489.08			S_{32} 8
17.219	1	486.18		S_{21} 10	
18.041	1	483.67			T_{31} 4
18.166	1	483.28			
18.267	5	482.97			S_{32} 7
18.600	1	481.96			S_{31} 7
18.701	2	481.65			R_3 13
18.794	1	481.36			
19.117	1	480.37			
19.339	1	479.70			
19.508	1	479.18			
19.614	1	478.86			
19.708	3	478.57		S_{21} 9	
19.884	1	478.28			R_{32} 12
20.080	1	477.43			
20.158	2	477.20			S_{32} 6
20.264	1	476.87			R_3 12
20.543	3	476.02			T_{31} 3
21.268	2	473.80			R_{32} 11
21.419	1d	473.34			
21.723	3	472.41			R_3 11
21.822	1	472.11			
21.935	6	471.77			S_{32} 5
22.026	1	471.49			
22.122	1	471.19		S_{21} 8	
22.215	1	470.91			
22.297	2	470.66			S_{31} 5
22.527	1	469.96			
22.630	2	469.65			R_{32} 10
22.754	1	469.27			
22.897	3	468.83		R_2 13	T_{31} 2
23.082	2	468.27			R_3 10

λ	I	ν	Classification 12-8		
5723.254	2	17 467.74		R_{21} 13	
23.488	1	467.03			
23.596	4	466.70			S_{32} 4
23.673	1	466.46			
23.788	1	466.11			
23.891	4	465.80			R_{32} 9
24.023	1	465.39			
24.119	2	465.10	R_1 15		
24.247	1	464.71			R_{31} 9
24.350	5	464.40			R_3 9
24.468	5	464.04		S_{21} 11	
24.645	1	463.50		R_2 12	
24.921	1	462.65			
25.040	4	462.29		R_{21} 12	R_{32} 8
25.133	9	462.01		[T_{31} 1	S_{32} 3
25.365	1	461.30			R_{31}–
25.486	4	460.93		[S_{31} 3	R_3 8
25.700	1	460.28			
25.983	1	459.42			
26.094	6	459.08			R_{32} 7
26.278	1	458.52			
26.346	2	458.31	R_1 14	R_2 11	
26.447	1	458.00			R_{31} 7
26.555	7	457.67		[S_{32} 2	R_3 7
26.647	1	457.39			
26.731	5	457.14	[S_{21} 6	R_{21} 11	
26.859	2	456.75			S_{31} 2
27.025	4	456.24			R_{32} 6
27.107	1	455.99			
27.181	4	455.76			T_{31} 0
27.407	1	455.08			R_{31} 6
27.505	4	454.77			R_3 6
27.690	1	454.21			
27.813	9	453.84			S_{32} 1
27.845	9	453.74			R_{32} 5
27.962	2	453.38		R_2 10	
28.109	3	452.93			S_{31} 1
28.222	1	452.60			R_{31} 5
28.333	7	452.26		R_{21} 10	R_3 5
28.394	2	452.07	R_1 13		
28.456	1	451.88			
28.529	4	451.66			R_{32} 4
28.801	1	450.83			
28.945	7	450.39		S_{21} 5	
29.028	2	450.14			R_3 4
29.090	7	449.95			R_{32} 3
29.227	1d	449.54			
29.341	1	449.19			
29.439	1	448.89			R_{31} 3
29.519	6	448.64		R_2 9	R_{32} 2
29.625	5	448.32			R_3 3
29.719	1	448.03			
29.798	3	447.80			Q_3 15
29.900	6	447.40		R_{21} 9	
30.013	1	447.14			
30.121	2	446.80			R_3 2
30.341	1	446.14			

λ	I	ν	Classification 12-8			λ	I	ν	Classification 12-8		
5730.474	2	17 445.73	R_1 12			5736.700	1	17 426.80			
30.586	2	445.40			Q_3 14	36.780	2	426.56		Q_{21}12	
30.674	1d	445.12				36.866	1	426.30		Q_{23}12	
30.847	1	444.60			Q_{32}13	36.960	1	426.91			
31.004	2	444.12		R_2 8		37.056	5	425.72		S_{21} 1	
31.079	4	443.89		S_{21} 4		37.118	1	425.53			
31.183	1	443.58				37.178	5	425.35		Q_2 11	
31.305	5	443.21			Q_3 13	37.244	2	425.15			P_3 5
31.389	4	442.95		R_{21}8		37.326	1	424.90			
31.498	1	442.61				37.405	2	424.66		R_2 3	
31.637	1d	442.19				37.477	1	424.44			
31.750	1	441.85				37.558	2	424.20		Q_{21}11	
31.917	3	441.34			Q_3 12	37.641	3	423.94		Q_{23}11	
31.983	1	441.14			Q_{32}11	37.751	9	423.61		R_{21}3	
32.078	1	440.85			Q_{32}3	37.827	1	423.38			
32.297	1	440.18				37.903	4	423.15		Q_2 10	
32.428	9	439.79		R_2 7	Q_3 11	38.052	1	422.70			
32.495	7	439.59	R_1 11		Q_{32}4	38.172	3	422.33			
32.606	3	439.25			Q_3 3	38.247	1	422.10			
32.713	3	438.92			Q_{32}9	38.324	6	421.87	R_1 8		P_3 6
32.794	9	438.68		R_{21}7	Q_{32}5	38.376	3	421.71		Q_{23}10	
32.852	5	438.50			Q_3 10	38.466	1	421.44		R_2 2	
32.913	1	438.32			Q_{32}8	36.558	7	421.16		Q_2 9	
32.992	5	438.07		[Q_{32}7	Q_3 4	38.664	1	420.84			
33.069	1	437.84				38.744	1	420.59			
33.156	9b	437.57		S_{21} 3	Q_3 9	38.821	5	420.36		R_{21}2	
33.275	8	437.21			Q_3 5	38.937	3	420.01		Q_{23}9	
33.366	5	436.94			Q_3 8	39.023	4	419.75		Q_{21}9	
33.449	9	436.68		[Q_3 6	Q_3 7	39.142	4	419.39		Q_2 8	
33.545	2	436.39		Q_2 15		39.271	1	419.00			
33.647	1	436.08				39.384	4	418.65			P_3 7
33.761	2	435.73		R_2 6		39.463	1	418.44	Q_1 15		
33.830	1	435.52				39.518	6	418.25	[R_2 1	Q_{21}8	
33.951	1	435.16				39.594	2	418.02			
34.055	1	434.84				39.652	6	417.84		Q_2 7	Q_{23}8]
34.142	5	434.58		R_{21}6		39.734	1	417.59			
34.359	1	433.92				39.807	6	417.37		R_{21}1	
34.475	3	433.56	R_1 10			39.930	1	416.97			
34.568	2	433.28		Q_2 14		40.027	4	416.70		Q_{21}7	
34.788	1	432.61				40.117	7	416.43		Q_2 6	Q_{23}7]
34.944	1	432.14				40.197	8	416.18	R_1 7		P_3 8
35.045	3	431.83		R_2 5		40.270	1	415.96			
35.142	4	431.54		S_{21} 2	R_3 5]	40.369	1	415.66			
35.325	1	430.98				40.472	7	415.35		Q_2 5	Q_{21}6]
35.413	9	430.71		R_{21}5		40.576	4	415.04		Q_{23}6	
35.510	4	430.42		Q_2 13		40.693	2	414.68		R_{21}0	
35.649	1	429.99				40.787	2	414.40		Q_2 4	
35.871	1	429.32		Q_{21}13		40.832	6	414.26		Q_{21}5	
35.971	2	429.02		Q_{23}13	P_3 4	40.961	7	413.87		Q_{23}5	
36.096	1	428.64				41.030	6	413.66		Q_2 3	P_3 9
36.246	2	428.18		R_2 4		41.133	2	413.34		Q_{21}4	
36.332	1	427.92				41.214	1	413.10		Q_2 2	
36.418	8	427.66	R_1 9	Q_2 12		41.292	5	412.86		Q_{23}4	
36.520	1	427.35				41.376	4	412.61		Q_{21}3	
36.616	6	427.06		R_{21}4		41.460	1	412.35			

λ	I	ν	Classification 12-8			λ	I	ν	Classification 12-8		
5741.570	8	17 412.02		$Q_{23}3$	$Q_{21}2$]	5747.698	9	17 393.46		$P_{23}10$	$O_{23}4$]
41.670	3	411.72		$Q_{21}1$	P_3 10	47.793	1	393.17			
41.741	1	411.50				47.891	5	392.87		$P_{23}11$	
41.820	5	411.26		$Q_{23}2$		48.014	3	392.50		$P_{23}12$	
41.923	1	410.95				48.096	4	392.25		$P_{23}13$	
42.044	8	410.58	R_1 6	Q_1 13]		48.204	1	391.93			
42.160	7	410.23		$Q_{23}1$		48.287	6	391.67	$Q_{12}7$		
42.222	4	410.05			P_3 11	48.503	2	391.02			
42.391	1	409.53				48.577	1	390.80			
42.510	1	409.17				48.666	10b	390.53	Q_1 7		
42.647	2	408.75			P_3 12	48.771	1	390.21			
42.875	1	408.06	$Q_{12}12$			48.874	1	389.90			
42.973	3	407.77			P_3 13	48.982	2d	389.57			
43.054	1	407.52				49.060	1	389.33			
43.133	1	407.28				49.141	5	389.09	R_1 2		
43.199	1	407.08				49.215	7	388.87		$O_{23}5$	
43.259	5	406.90	Q_1 12			49.277	5	388.68	$Q_{12}6$		
43.348	2	406.63				49.395	1	388.32			
43.534	1	406.07				49.530	2	387.91			
43.653	6	405.71		$P_{23}2$		49.645	10	387.57	Q_1 6		
43.754	1	405.40		P_2 3		49.836	1	386.99			
43.852	9	405.10	R_1 5			49.917	1	386.74			
43.940	1	404.83				50.101	1	386.19			
44.036	2	404.54	$Q_{12}11$			50.236	8	385.78	$Q_{12}5$		
44.176	1	404.12				50.328	1	385.50			
44.328	10	403.66		P_{23}[illegible]		50.428	2	385.20			
44.417	9	493.39	Q_1 11			50.509	1	384.95			
44.838	1	402.11				50.600	10b	384.68	Q_1 5		
44.979	8	401.69		$P_{23}4$		50.675	4	384.45		$O_{23}6$	
45.065	1	401.43		P_2 5		50.769	1	384.17			
45.157	2	401.15	$Q_{12}10$			50.854	6	383.91	R_1 1		
45.405	1	400.40				50.944	1	383.64			
45.538	8	400.00	Q_1 10			51.075	1	383.24			
45.581	10	17 399.87	R_1 4	$P_{23}5$		51.172	4	382.95	$Q_{12}4$		
45.640	8	399.69	R_1 4	P_2 6		51.267	1	382.66			
45.729	1	399.42				51.400	1	382.26			
45.855	1	399.03				51.534	10	381.85	Q_1 4		
46.005	1	398.58				51.668	1	381.45			
46.141	10	398.17	[$O_{23}3$	$P_{23}6$	P_2 7]	51.811	1	381.02			
46.236	4	397.[illegible]	$Q_{12}9$			51.957	1	380.58			
46.419	1	397.33				52.080	9	380.21	$Q_{12}3$	$O_{23}7$	
46.495	1	397.10				52.189	1	379.88			
46.555	2	396.92		P_2 8		52.306	1	379.52			
46.612	10b	396.75	Q_1 9	$P_{23}7$		52.439	10b	379.12	Q_1 3		
46.735	1	396.37				52.528	2	378.85	R_1 0		
46.830	2	396.08				52.619	1	378.58			
46.934	4	395.77		P_2 9		52.726	2	378.25	$P_{12}15$		
47.042	7	395.44	R_1 3	$P_{23}8$		52.861	1	377.85			
47.135	1	395.16				52.991	4	377.45	$Q_{12}2$		
47.214	2	394.92		P_2 10		53.060	1	377.24			
47.269	4	394.69	$Q_{12}8$			53.125	4	377.05	$P_{12}14$	P_1 15]	
47.398	10b	394.37	R_1 3	$P_{23}9$	P_2 11]	53.221	2	376.76			
47.493	1	394.08				53.325	8	376.45	Q_1 2		
47.565	3	393.86		P_2 12		53.400	4	376.22		$O_{23}8$	
47.650	8	393.60	Q_1 8	P_2 13		53.454	4	376.05	$P_{12}13$		

λ	I	ν	Classification 12-8		11-7	
5753.519	1	17 375.86	P_1 14			
53.636	1	375.50				
53.745	3	375.18	P_{12}12			
53.839	5	374.89	P_1 13			
53.894	5	374.73	Q_{12}1			
53.989	6	374.44	P_{12}11			
54.064	1	374.21				
54.119	3	374.05	P_1 12			
54.166	9	373.90	P_{12}10			
54.206	9	373.78	Q_1 1	[P_{12}10]		
54.289	2	373.53	P_{13}12			
54.370	9b	373.29	P_{12}9	[P_1 11]		
54.509	7	372.87	P_{12}8			
54.568	2	372.69	P_{12}7			
54.618	10	372.54	P_1 10			
54.662	1	372.41		O_{23}9		
54.705	6	372.28	P_{12}6			
54.760	10	372.12	P_{12}5	[P_1 9]		
54.824	10	371.92	P_{12}1-4			
54.873	10b	371.77	P_1 8	[P_{12}1,2]		
54.937	1	371.58				
54.992	10	371.42	P_1 7	[Q_1 0]		
55.076	5	371.16	P_1 6			
55.132	10	370.99	P_1 5	[P_1 0]		
55.189	10b	370.82	$P_1$1-4			
55.399	1d	370.18				
55.610	1d	369.55				
55.748	1	369.13				
55.854	3	368.81		O_{23}10		
56.152	1d	367.91				
56.320	1d	367.40				
56.492	7	366.88	O_{12}1			
56.865	1	365.76				
56.980	4	365.41		O_{23}11		
57.125	2	364.98			S_{21} 13	
57.238	1	364.63				
57.342	5	364.32	O_{12}2	[O_{13}1]		
57.433	1	364.05				
57.534	3	363.74				S_{32} 11
57.668	1	363.34				
57.808	1	362.92				
57.931	2	362.54	O_{13}2			
58.050	3	362.17	N_{13}2	O_{23}12		
58.178	10	361.80	O_{12}3			
58.325	1	361.36				
58.499	1	360.83				
58.631	1	360.43				
58.723	3	360.16	O_{13}3			
58.840	1	359.80				
58.923	1	359.55				
59.008	6	359.30	O_{12}4	O_{23}13		
59.112	1	358.99				
59.226	1	358.64				
59.303	1	358.41				
59.402	1	358.11				

λ	I	ν	Classification 12-8		11-7	
5759.517	2	17 357.76	O_{13}4			
59.579	1	357.58				
59.651	1	357.36				
59.727	3	357.13	N_{12}3			
59.818	10	356.86	O_{12}5			
59.902	2	356.60			S_{21} 12	S_{32} 10
60.024	1	356.24				
60.236	1	355.60				
60.312	4	355.37	O_{13}5			
60.421	1	355.04				
60.515	1	354.76				
60.615	8	354.46	O_{12}6			T_{31}6
60.738	1	354.08				
60.988	1	353.33				
61.091	2	353.02	O_{13}6			
61.190	1	352.72				
61.296	1	352.40				
61.395	10	352.11	O_{12}7	[N_{13}4]		
61.496	2	351.80				
61.659	1	351.31				
61.767	1	350.98				
61.868	4	350.68	O_{13}7			
62.033	1	350.18				
62.148	9	349.84	O_{12}8			S_{32} 9
62.312	1	349.34				
62.450	1	348.93				
62.585	3	348.52	O_{13}8			
62.732	2	348.08				
62.876	9	347.65	O_{12}9			
62.976	1	347.34				
63.071	5	347.06	N_{13}5			
63.184	1	346.72				
63.265	1	346.47				
63.347	3	346.23	O_{13}9			
63.446	3	345.93				T_{31}5
63.569	4	345.56	O_{12}10			
63.697	1	345.17				
64.034	2d	344.16	O_{13}10			
64.150	1	343.81				
64.241	7	343.54	O_{12}11			
64.308	2	343.34				S_{32} 8
64.385	1	343.10				
64.567	1	342.56				R_{32}14
64.691	2	342.18	O_{13}11			S_{31} 8
64.758	2	341.98	N_{13}6			
64.869	2	341.65	O_{12}12			
65.038	1	341.14				R_2 14
65.181	2	340.71		S_{21} 10		
65.312	1	340.32	O_{13}12			
65.454	3	339.89	O_{12}13			
65.918	1	338.49	O_{13}13			
65.016	1	338.20	O_{12}14			
66.140	2	337.83				T_{31}4
66.252	1	337.49				
66.381	8	337.10	N_{13}7			S_{32} 7

λ	I	ν	Classification 12-8	Classification 11-7		λ	I	ν	Classification 11-7		
5766.506	2	17 336.73	O_{22}15			5772.741	1	17 318.00			
66.615	1	336.40				72.812	1	317.79			
66.757	3	335.97			S_{31} 7	72.871	3	317.61		R_2 12	
66.842	4	335.71			R_3 13	73.033	1	317.12			
66.945	1	335.41				73.136	1	316.81			
67.070	1	335.03				73.254	2	316.46		R_{21}12	
67.206	2	334.62		R_2 15		73.365	5	316.13			R_{32}8
67.352	1	334.18				73.451	10	315.87		[T_{31}1	S_{32} 3
67.472	1	333.82				73.564	1	315.53			
67.572	1	333.52				73.687	1	315.16			
67.648	2	333.29				73.796	6	314.84			S_{31} 3
67.750	4	332.99		S_{21} 9		73.843	6	314.69			R. 8
67.878	1	332.60				73.945	1	314.39			
67.974	2	332.31			R_{32}12	74.045	1	314.09			
68.082	1	331.99	N_{13}8			74.131	2	313.83			
68.197	1	331.64				74.231	1	313.53			
68.320	4	331.27			S_{32} 6	74.340	2	313.20			
68.438	3	330.92			R_3 12	74.448	9	312.88			R_{32}7
68.525	1	330.66				74.535	1	312.62			
68.626	2	330.35				74.606	5	312.41		R_2 11	
68.707	5	330.11		[T_{31}3	S_{31} 6	74.724	1	312.05			
69.154	1	328.77		R_2 14		74.824	2	311.75			R_{31}7
69.348	1	328.18				74.911	9	311.49		[R_3 7	S_{32}2
69.479	4	327.79			R_{32}11	74.995	7	311.24	[S_{21} 6	R_{21}11	
69.576	1	327.50				75.097	1	310.93			
69.694	2	327.15	N_{13}9			75.233	3	310.53			S_{31}2
69.840	1	326.71			R_{31}11	75.307	2	310.30			
69.943	6	326.40			R_3 11	75.409	6	310.00			R_{32}6
70.045	1	326.09				75.492	1	309.75			
70.152	8	325.77			S_{32}5	75.570	5	309.52			T_{31}0
70.250	3	325.54		S_{21} 8		75.721	1	309.06			
70.329	1	325.24				75.811	2	308.79			R_{31}6
70.420	1	324.97				75.899	5	308.53			R_3 6
70.521	3	324.66			S_{31} 5	75.975	1	308.30			
70.634	1	324.32				76.087	2	307.97			
70.759	1	323.95				76.218	10	307.58			S_{32} 1
70.878	3	323.59			R_{32}10	76.250	10	307.48		R_2 10	R_{32}5
70.962	1	323.34				76.388	3	307.07			
71.049	3	323.08		R_2 13		76.522	4	306.66			S_{31} 1
71.153	3	322.76			T_{31}2	76.640	6	306.31	R_1 13	R_{21}10	R_{31}5
71.246	1	322.49			R_{31}10	76.747	8	305.99			R_3 5
71.342	4	322.20			R_3 10	76.852	1	305.68			
71.435	2	321.92		R_{21}13		76.957	6	305.36			R_{32}4
71.547	1	321.58				77.102	1	304.93			
71.743	1	320.99				77.244	8	304.50		S_{21} 5	
71.864	7	320.63			S_{32} 4	77.386	2	304.08			R_{31}4
71.961	1	320.34				77.470	5	303.82			R_3 4
72.060	1	320.04				77.539	8	303.62			R_{32}3
72.174	6	319.70			R_{32}9	77.658	1	303.26			
72.239	5	319.51			S_{31} 4	77.754	1	302.97			
72.328	1	319.24				77.875	6	302.61		R_2 9	R_{31}3
72.411	1	318.99				77.974	4	302.31			R_{32}2
72.491	2	318.75				78.085	6	301.98			R_3 3
72.566	1	318.52			R_{31}9	78.173	1	301.72			
72.643	10	318.29		S_{31} 7	R_3 9	78.253	8	301.48		R_{21}9	

λ	I	ν	Classification 11-7		
5778.295	7	17 301.35		$[R_{32}2$	Q_3 15
78.383	1	301.09			
78.503	1	300.73			
78.590	2	300.47			R_3 2
78.673	1	300.22			
78.753	3	17 299.98	R_2 12		
78.952	1	299.39			
79.049	1	299.10			
79.113	3	298.90			Q_3 14
79.230	1	298.55			
79.322	1	298.28			
79.389	4	298.08		R_2 8	$Q_{32}13$
79.443	5	297.92		S_{21} 4	
79.547	1	297.61			
79.668	1	297.24			
79.779	8	296.91		$R_{21}8$	
79.845	8	296.71			Q_3 13
80.023	1	296.18			$Q_{32}12$
80.216	1	295.60			
80.349	1	295.21			
80.466	5	294.86			Q_3 12
80.532	2	294.66			$Q_{32}11$
80.619	2	294.40			$Q_{32}3$
80.720	2	294.10			
80.838	5	293.74	R_1 11	R_2 7	
80.918	1	293.50		Q_2 16	
80.995	9	293.27			Q_3 11
81.074	1	293.04			$Q_{32}4$
81.155	4	292.79			Q_3 3
81.236	9	292.56		$R_{21}7$	
81.281	1	292.42			
81.347	4	292.22			$Q_{32}5$
81.429	6	291.97			Q_3 10
81.496	2	291.77			$Q_{32}6$
81.568	9b	291.56	$[Q_1$ 4	S_{21} 3	$Q_{32}7$
81.662	1	291.28			
81.743	9	291.04			Q_3 9
81.852	8	290.71			Q_3 5
81.940	6	290.45			Q_3 8
82.007	10	290.25		$[Q_3$ 6	Q_3 7
82.037	9	290.16		Q_2 15	
82.075	1	290.05			
82.142	1	289.84			
82.222	3	289.60		R_2 6	
82.311	2	289.34			
82.448	2	288.93			
82.538	1	288.66			
82.610	8	288.44		$R_{21}6$	
82.737	1	288.06			
82.860	4	287.70	R_1 10		
82.977	1	287.35			
83.112	3	286.94		Q_2 14	
83.208	1	286.65			
83.436	1	285.97			
83.542	5	285.66		R_2 5	

λ	I	ν	Classification 11-7		
5783.627	5	17 285.40		S_{21} 2	
83.727	1	285.10			
83.827	2	284.80			
83.917	10	284.54		$R_{21}5$	
84.004	1	284.28			
84.077	6	284.06		Q_2 13	
84.346	1	283.25			
84.448	2	282.95		$Q_{21}13$	
84.540	2	282.68		$Q_{23}13$	
84.643	1	282.37			P_3 4
84.784	3	281.95		R_2 4	
84.856	10	281.73	R_1 9		
84.968	5	281.40		Q_2 12	
85.069	1	281.09			
85.155	8	280.84		$R_{21}4$	
85.246	1	280.57			
85.323	4	280.33	Q_1 17	$Q_{21}12$	
85.431	2	280.01		$Q_{23}12$	
85.514	1	279.76			
95.600	8	279.51		S_{21} 1	
85.691	1	279.24			
85.780	8	278.97		Q_2 11	
85.866	1	278.71			
85.956	4	278.45		R_2 3	P_3 5
86.057	1	278.14			
86.167	3	277.82		$Q_{21}11$	
86.244	3	277.59		$Q_{23}11$	
86.321	10	277.35		$R_{21}3$	
86.424	1	277.05			
86.521	5	276.76		Q_2 10	
86.636	1	276.41			
86.735	3	276.12	Q_1 16		
86.810	6	275.89	R_1 8		
86.901	2	275.62		$Q_{21}10$	
86.994	2	275.35		$Q_{23}10$	
87.113	2	274.99			P_3 6
87.190	9	274.76		Q_2 9	
87.310	1	274.40			
87.417	6	274.08		$R_{21}2$	
87.473	3	273.92		S_{21} 0	
87.577	4	273.61		$Q_{21}9$	
87.663	5	273.35		$Q_{23}9$	
87.785	5	272.98		Q_2 8	
88.014	1	272.30			
88.113	8	272.01	Q_1 15		
88.168	8	271.84		$Q_{21}8$	P_3 7
88.246	3	271.61		$Q_{23}8$	
88.307	8	271.44		Q_2 7	
88.376	1	271.22			
88.438	8	271.04		$R_{21}1$	
88.515	1	270.81			
88.605	1	270.54			
88.698	10	270.26		$Q_{21}7$	
88.736	10	270.15	R_1 7	Q_2 6	
88.790	10	269.99		$Q_{23}7$	

λ	I	ν	Classification 11-7		
5785.884	1	17 269.71			
89.962	1	269.47			
89.066	3	269.16			P_3 8
89.142	8	268.94		$Q_{21}6$	Q_2 5]
89.247	5	268.62		$Q_{23}6$	
89.360	2	268.29		$R_{21}0$	
89.436	5	268.05	Q_1 14	Q_2 4	
89.516	6	267.82		$Q_{21}5$	
89.642	9	267.44		$Q_{23}5$	
89.716	2	267.22		Q_2 3	
89.803	2	266.96		$Q_{21}4$	
89.853	5	266.82			P_3 9
89.975	4	266.45		$Q_{23}4$	
90.057	4	266.21		$Q_{21}3$	
90.163	1	265.89			
90.256	9	265.61		$Q_{23}3$	
90.320	3	265.42		$Q_{21}1$	
90.418	1	265.13			
90.518	8	264.83		$Q_{23}2$	P_3 10
90.619	7	264.53	R_1 6		
90.707	9	264.27	Q_1 13		
90.785	1	264.04			
90.863	9	263.80		$Q_{23}1$	
90.962	1	263.51			
91.087	6	263.14			P_3 11
91.201	1	262.80			
91.407	1	262.18			
91.539	4	261.79			P_3 12
91.768	1	261.11		P_2 2	
91.879	5	260.77			P_3 13
91.934	7	260.61	Q_1 12		
92.028	1	260.33			
92.133	3	260.02			P_3 14
92.196	1	259.83			
92.275	5	259.59			P_3 15
92.329	2	259.43			
92.403	7	259.21		$P_{23}2$	
92.481	10	258.98	R_1 5		
92.605	1	258.61			
92.723	4	258.26	$Q_{12}11$		
92.866	1	257.83			
92.956	1	257.57			
93.040	3	257.32			
93.111	10b	257.11	Q_1 11	$P_{23}3$	
93.265	1	256.65		P_2 4	
93.662	1	255.46			
93.776	10	255.12		$P_{23}4$	
93.882	4	254.81	$Q_{12}10$	P_2 5	
94.114	1	254.12			
94.256	10	253.70	Q_1 10		
94.324	7	253.50	R_1 4		
94.408	10b	253.24		$P_{23}5$	
94.491	1	252.99		P_2 6	
94.591	1	252.70			
94.724	1	252.30			

λ	I	ν	Classification 11-7		
5794.845	1	17 251.94			
94.910	2	251.75			
94.981	10	251.54	$Q_{12}9$	$P_{23}6$, $P_2 7$	$O_{23}2$]
95.125	1	251.11			
95.250	2	250.73			
95.359	10b	250.41	Q_1 9		
95.487	10b	250.03		P_2 8	$P_{23}7$]
95.638	1	249.58			
95.729	1	249.31			
95.826	6	249.02		P_2 9	
95.928	7	248.72		$P_{23}8$	
96.031	4	248.41	$Q_{12}8$		
96.129	10	248.12	R_1 3	P_2 10	
96.219	1	247.85			
96.299	10	247.61		$P_{23}9$	
96.358	3	247.44		P_2 11	
96.422	10	247.25	Q_1 8		
96.513	4	246.97		P_2 12	
96.595	10	246.73	[$O_{23}4$	P_2 13	$P_{23}10$]
96.720	1	246.36			
96.825	8	246.05		$P_{23}11$	
96.902	1	245.82			
96.977	5	245.60		$P_{23}12$	
97.063	10	245.34	$Q_{12}7$	$P_{23}13$	
97.454	10b	244.18	Q_1 7		
97.683	1	243.49			
97.837	1	243.04			
97.924	7	242.76	R_1 2		
97.995	1	242.57			
98.072	6	242.34	$Q_{12}6$		
98.153	8	242.10		$O_{23}5$	
98.250	1	241.81			
98.345	1	241.53			
98.451	10	241.21	Q_1 6		
98.617	1	240.72			
98.955	1	239.71			
99.058	9	239.41	$Q_{12}5$		
99.172	1	239.07			
99.287	2d	238.73			
99.362	2	238.50			
99.404	10	238.38			
99.457	10	238.22	Q_1 5		
99.557	1	237.92			
99.673	9	237.58	R_1 1	$O_{23}6$	
99.780	1	237.26			
99.909	1	236.88			
5800.016	5	236.56	$Q_{12}4$		
00.100	2	236.31			
00.257	1	235.84			
00.385	10	235.46	Q_1 4		
00.690	1	234.56			
00.831	2	234.14			
00.962	9	233.75	$Q_{12}3$		
01.040	1	233.52			
01.107	9	233.32		$O_{23}7$	

λ	I	ν	Classification 11-7		
5801.236	3	17 232.93			
01.291	10	232.77	Q_1 3		
01.334	10	232.64			
01.395	1	232.46	R_1 0		
01.492	1	232.17			
01.611	2	231.82			
01.690	1	231.58			
01.745	4	231.42	P_{12}15		
01.825	1	231.18			
01.889	4	230.99	Q_{12}2		
01.971	1	230.75			
02.064	1	230.47			
02.145	6	230.24	P_{12}14	P_1 15]	
02.230	9	229.98	Q_1 2		
02.363	1	229.59			
02.479	9	229.25	P_{12}13	O_{23}8	
02.534	4	229.08	P_1 14		
02.635	1	228.76			
02.749	4	228.45	P_{12}12		
02.811	5	228.26	Q_{12}1		
02.868	7	228.09	P_1 13		
02.936	2	227.89	P_{13}13		
02.995	8	227.71	P_{12}11		
03.051	2	227.55			
03.114	9b	227.36	Q_1 1		
03.158	2	227.23	P_1 12		
03.201	7	227.10	P_{12}10		
03.243	2	226.98	P_{13}12		
03.276	1	226.88			
03.306	2	226.79			
03.369	10b	226.60	P_1 11	P_{12}9]	
03.438	1	226.40			
03.492	7	226.23	P_{12}8		
03.550	2	226.07			
03.593	10	225.93	P_1 10	P_{12}7]	
03.676	8	225.69	P_{12}6		
03.740	10b	225.50	P_1 9	P_{12}4, 5]	
03.820	10b	225.27	P_{12}1-3	O_{23}9	
03.883	5	225.08	P_1 8		
03.937	4	224.92	Q_1 0		
03.979	10	224.79	P_1 7		
04.065	10	224.54	P_1 6	P_1 0]	
04.113	10	224.40	P_1 5	P_1 1]	
04.159	10	224.26	$P_1$2, 4		
04.352	1	223.68	P_{13}3		
04.479	1	223.31	P_{13}2		
04.897	1	222.06			
05.029	5	221.68		O_{23}10	
05.198	1	221.14			
05.364	1	220.68			
05.489	9	220.31	O_{12}1		
05.644	1	219.85			
05.994	1	218.81			
06.120	1	218.44			
06.202	7	218.19		O_{23}11	

λ	I	ν	Classification 11-7		10-6	
5806.290	1	17 217.93				
06.368	7	217.70	O_{12}2	O_{13}1]		
06.492	1	217.33				
06.586	3	217.06				
06.672	1	216.80				
06.810	2	216.39				
06.931	2	216.03				
07.000	2	215.83	O_{13}2			
07.131	2	215.44	N_{13}2			
07.237	10	215.13	O_{12}3	O_{23}12		
07.788	5	213.49	O_{13}3			
07.937	1d	213.05				
08.094	9	212.58	O_{12}4			
08.200	1	212.27				
08.305	5	211.96		O_{23}13		
08.393	1	211.70				
08.517	1	211.33				
08.615	4	211.04	O_{13}4			
08.692	1	210.81				
08.763	2	210.60				
08.833	5	210.40	N_{13}3			
08.936	10b	210.09	O_{12}5			
09.060	2	209.72				
09.153	1	209.45				
09.245	3	209.18		O_{23}14		
09.357	1	208.84				
09.442	6	208.59	O_{13}5			
09.600	2	208.12				
09.764	9	207.64	O_{12}6			
09.937	1	207.13				
10.119	2	206.58		O_{23}15		
10.262	3	206.16	O_{13}6			
10.400	1	205.75				
10.575	10b	205.24	O_{12}7	N_{13}4]		
10.763	1	204.68				
10.922	1	204.21		O_{23}16		
11.057	5	203.81	O_{13}7			
11.166	1	203.49				
11.290	2	203.12				
11.368	9	202.89	O_{12}8			
11.629	1	202.12		O_{23}17		
11.729	2	201.82			S_{23} 11	
11.833	3	201.51	O_{13}8			
11.977	2	201.09				
12.121	10	200.66	O_{12}9			
12.204	1	200.41				
12.296	6	200.14	N_{13}5			
12.453	1	17 199.68				
12.601	3	199.24	O_{13}9			
12.707	4	198.92				T_{31}5
12.853	7	198.49	O_{12}10			
13.167	1	197.56				
13.331	2	197.08	O_{13}10			
13.461	2	196.79				
13.553	8	196.42	O_{12}11			

λ	I	ν	Classification 11-7		Classification 10-6	
5813.626	3	17 196.20				S_{32} 8
13.754	1	195.83				
13.863	1	195.51				
14.024	5	195.13	O_{13}11	N_{13}6]		
14.123	1	194.73				
14.211	1	194.47	O_{12}12			
14.320	1	194.15				
14.416	2	193.87			S_{21} 10	
14.486	2	193.66				
14.599	1	193.33				
14.723	1	192.96	O_{13}12			
14.840	5	192.62	O_{12}13			
14.940	1	192.32				
15.066	2	191.95				
15.149	2	191.70				
15.272	1	191.34				
15.401	2	190.96	O_{12}14			
15.503	2	190.65				T_{31}4
15.629	1	190.29				
15.750	9	189.93	N_{13}7			S_{32} 7
15.849	1	189.63				
15.955	3	189.32	O_{12}15			
16.041	1	189.07				
16.132	2	188.80				S_{31} 7
16.256	4	188.43				R_3 13
16.336	1	188.20				
16.427	2	187.92				
16.530	2	187.62			R_2 15	
16.643	1	187.29				
16.777	1	186.89				
16.862	1	186.64				
16.927	2	186.45			R_{21}15	
17.048	4	186.09			S_{21} 9	
17.247	1	185.50				
17.390	2	185.08				R_{32}12
17.465	2	184.86	N_{13}8			
17.610	1	184.42				
17.754	5	184.01				S_{32} 6
17.892	2	183.60				R_3 12
18.042	2	183.16				
18.148	6	182.84			{T_{31}3	S_{31} 6
18.407	1	182.07				
18.555	1	181.64			R_2 14	
18.706	1	181.13				
18.856	1	180.75				
18.959	5	180.45			R_{21}14	R_{32}11
19.072	1	180.11				
19.167	3	179.83	N_{13}9			
19.300	1	179.44				
19.433	6	179.03				R_3 11
19.512	1	178.81				
19.584	2	178.60			S_{21} 8	
19.642	9	178.43				S_{32} 5
19.882	1	177.80				
20.023	3	177.31				S_{31} 5

λ	I	ν	Classification 10-6		
5820.141	1	17 176.97			
20.293	1	176.52			
20.401	3	176.20			R_{32}10
20.490	3	175.94		R_2 13	
20.570	1	175.70			
20.669	3	175.41			T_{31}2
20.761	1	175.14			
20.829	1	174.94			R_{31}10
20.878	5	174.79		R_{21}13	R_3 10
20.982	1	174.48			
21.148	1	174.00			
21.296	1	173.56			
21.413	6	173.21			S_{32} 4
21.532	1	172.86			
21.633	3	172.57			
21.738	7	172.25			R_{32}9
21.789	3	172.10			S_{31} 4
21.893	1	171.80			
21.992	2	171.50			
22.082	7	171.24		S_{21} 7	
22.147	1	171.05			R_{31}9
22.215	7	170.85			R_3 9
22.356	2	170.44		R_2 12	
22.476	1	170.08			
22.556	1	169.84			
22.647	1	169.58			
22.751	2	169.27		R_{21}12	
22.865	1	168.93			
22.964	5	168.64			R_{32}8
23.044	10	168.40		[T_{31}1	S_{32} 3
23.175	1	168.02			
23.328	1	167.57			
23.400	5	167.35			S_{31} 3
23.445	5	167.22			R_3 8
23.625	1	166.69			
23.722	1	166.40			
23.823	1	166.10			
23.914	2	165.84			
23.982	2	165.64			
24.076	8	165.36			R_{32}7
24.146	5	165.16		R_2 11	
24.239	1	164.88			
24.345	1	164.57			
24.470	5	164.20		S_{21} 6	R_{31}7
24.553	10b	163.96	[S_{32} 2	R_{21}11	R_3 7
24.756	2d	163.36			
24.889	3	162.96			S_{31} 2
24.986	1	162.69			
25.070	6	162.43			R_{32}6
25.149	1	162.20			
25.231	6	161.96			T_{31}0
25.328	1	161.67			
25.411	1	161.43			
25.476	2	161.24			R_{31}6
25.570	5	160.96			R_3 6

λ	I	ν	Classification 10-6		
5825.658	1	17 160.70			
25.761	1	160.40			
25.842	2	160.16			
25.898	10	159.99		R_2 10	
25.933	10	159.89		[S_{32} 1	R_{32}5
26.035	1	159.59			
26.125	6	159.32			
26.209	4	159.08			S_{31} 1
26.255	4	158.94		R_{21}10	
26.331	1	158.72			R_{31}5
26.444	9	158.39			R_3 5
26.552	1	158.07			
26.669	7	157.72			R_{32}4
26.744	1	157.50			
26.825	8	157.27		S_{21} 5	
26.911	1	157.01			
27.030	2	156.66			R_{31}4
27.132	1	156.36			
27.188	6	156.20			R_3 4
27.266	9	155.96			R_{32}3
27.388	1	155.61			
27.498	5	155.28		R_2 9	
27.612	2	154.95			R_{21}3
27.722	4	154.63			R_{32}2
27.826	7	154.32			R_3 3
27.896	7	15[illegible].11		R_{21}9	
27.984	2	15[illegible].86			
28.074	5	153.59			R_{31}2
28.192	2	153.24			
28.318	4d	152.87	R_1 12		R_3 2
28.501	1[illegible]d	152.33			
28.653	1	15[illegible].88			
28.757	2	151.58			Q_3 14
28.843	1	151.33			
28.913	4	151.12			
29.074	7	150.64	[S_{21} 4	R_2 8	
29.140	3	150.45			Q_{32}13
29.323	1	149.92			
29.458	6	149.52		R_{21}8	
29.535	1	149.29			
29.613	8	149.06			Q_3 13
29.724	1	148.73			
29.846	2	148.38			Q_{32}12
29.96[illegible]	6	148.01			
30.134	1	147.53			
30.308	5	147.01			Q_3 12
30.375	2	146.82			Q_{32}11
30.438	7	146.63	R_1 11		Q_{32}3
30.554	5	146.29		R_2 7	
30.645	1	146.03			
30.757	2	145.70			
30.845	8	145.44		[Q_{32}4	Q_3 11
30.945	9	145.14		R_{21}7	
31.005	4	144.97			Q_3 3
31.124	4	144 62			Q_{32}9
5831.206	4	17 144.38			Q_{32}5
31.282	10	144.15	[Q_3 10	S_{21} 3	Q_{32}8
31.355	[illegible]	143.94			
31.419	8	143.75	[Q_{32}7	[Q_{32}6	Q_3 4
31.504	1	143.50			
31.606	10	143.20			Q_3 9
31.667	2	143.02			
31.715	9	142.88			Q_3 5
31.768	2	142.72			
31.815	7	142.58		Q_2 15	Q_3 8
31.873	10	142.42			Q_3 6
31.904	10	142.33			Q_3 7
31.977	1	142.11		R_2 6	
32.064	2	141.85			
32.251	1	141.30			
32.358	9	140.99		R_{21}6	
32.445	1	140.73			
32.522	4	140.51	R_1 10		
32.746	1	139.85			
32.916	4	139.35		Q_2 14	
33.184	2	138.56			
33.248	1	138.37			
33.320	6	138.17		R_2 5	
33.395	6	137.94		S_{21} 2	
33.552	2	137.48			
33.628	1	137.26			
33.705	10d	137.03		R_{21}5	
33.[illegible]0	1	136.66			
33.[illegible]	6	136.38		Q_2 13	
34.041	1	136.04			
34.183	1	135.63			
34.299	3	135.29			
34.407	3	134.97		Q_{23}13	
34.483	1	134.75			
34.568	10	134.50	R_1 9	R_2 4	P_3 4
34.724	1	134.0[illegible]			
34.834	[illegible]	133.[illegible]		Q_2 12	
34.899	1	133.52			
34.974	8	133.31		R_{21}4	
35.056	1	133.06			
35.136	3	132.83			
35.226	1	132.57		Q_{21}12	
35.320	2	132.29		Q_{23}12	
35.426	8	131.98		S_{21} 1	
35.510	3	131.73			
35.[illegible]97	1	131.51			
35.664	8	131.28		Q_2 11	
35.809	3	130.86		R_2 3	
35.873	1	130.67			
35.943	3	130.46			P_3 5
36.066	3	130.10		Q_{21}11	
36.137	2	129.89		Q_{23}11	
36.170	10	129.79		R_{21}3	
36.300	1	129.41			

λ	I	ν	Classification 10-6		
5836.418	5	17 129.07		Q_2 10	
36.494	1	128.84	Q_1 16		
36.578	7	128.60	R_1 8		
36.709	1	128.21			
36.817	3	127.90		Q_{21}10	
36.902	2	127.65		Q_{23}10	
37.026	1	127.28			
37.100	8	127.07		Q_2 9	
37.208	3	126.75			P_3 6
37.301	6	126.48		R_{21}2	
37.358	2	126.31		S_{21} 0	
37.428	1	126.10			
37.501	4	125.89		Q_{21}9	
37.583	5	125.65	Q_{12}15	Q_{23}9	
37.649	1	125.45			
37.709	5	125.28		Q_2 8	
37.837	2	124.90			
37.971	6	124.51	Q_1 15		
38.042	1	124.30		R_2 1	
38.106	4	124.12		Q_{21}8	
38.202	9	123.83		Q_{23}8	P_3 7
38.250	9	123.69		Q_2 7	
38.353	7	123.39		R_{21}1	
38.442	1	123.13			
38.541	9	122.84	R_1 7		
38.631	5	122.57		Q_{21}7	
38.727	8	122.29		Q_{23}7	Q_3 6]
38.829	1	121.99			
38.924	2	121.72	Q_{12}14		
39.026	2	121.42			
39.093	9	121.22		Q_{21}6	Q_2 5]
39.198	6	120.91		Q_{23}6	P_3 8
39.342	5	120.49	Q_1 14	R_{21}0	
39.411	2	120.29		Q_2 4	
39.475	7	120.10		Q_{21}5	
39.605	9	119.72		Q_{23}5	
39.678	2	119.50		Q_2 3	
39.785	4	119.19		Q_{21}4	
39.859	2	118.97		Q_2 2	
39.939	6	118.74		Q_{23}4	
39.980	7	118.62			P_3 9
40.031	6	118.47		Q_{21}3	
40.109	1	118.24			
40.180	2	118.03		Q_{21}2	
40.235	10	117.87	Q_{12}13	Q_{23}3	
40.345	1	[illegible]		Q_{21}1	
40.427	[illegible]	[illegible]			
40.488	10	[illegible]	R_1 6	Q_{23}2	
40.564	1	[illegible]			
40.642	9	[illegible]	Q_1 13		P_3 10
40.757	2	116.31			
40.850	10	116.07		Q_{23}1	
40.977	1	115.70			
41.116	1	115.29			
41.257	7	114.88			P_3 11

λ	I	ν	Classification 10-6		
5841.475	2	17 114.24	Q_{12}12		
41.612	1	113.84			
41.729	3	113.49			P_3 12
41.808	1	113.26		P_2 2	
41.888	8	113.03	Q_1 12		
41.980	1	112.76			
42.082	5	112.46			P_3 13
42.167	1	112.21			
42.279	1	111.88			
42.391	10	111.55	R_1 5		
42.442	9	111.40		P_{23}2	
42.515	6	111.19			
42.602	1	110.94		P_2 3	
42.693	4	110.67	Q_{12}11		
42.862	1	110.17			
42.969	1	109.86			
43.094	10	109.49	Q_1 11		
43.161	10	109.29		P_{23}3	
43.325	0	108.82		P_2 4	
43.551	1	108.16			
43.739	1	107.61			
43.864	10	107.24	Q_{12}10	P_{23}4	
44.003	2	106.83		P_2 5	
44.129	1	106.46			
44.268	10b	106.06	Q_1 10	R_1 4]	
44.386	1	105.71			
44.515	10b	105.34		P_{23}5	
44.610	1	105.06		P_2 6	
44.857	1	104.33			
44.983	7	103.97	Q_{12}9		
45.107	10b	103.60		P_{23}6	O_{23}3]
45.145	3	103.49		P_2 7	
45.242	1	103.21			
45.379	10b	102.80	Q_1 [illegible]		
45.520	1	102.40			
45.640	10b	102.04		P_{23}7	P_2 8]
45.774	1	101.65			
45.908	1	101.26			
46.010	6	100.96		P_2 9	
46.094	10	100.71	Q_{12}8	P_{23}8	
46.139	10	100.58	R_1 3		
46.238	1	100.29			
46.332	4	100.02		P_2 10	
46.417	2	17 099.77			
46.483	10b	099.58	Q_1 8	P_{23}9	
46.579	5	099.30		P_2 11	
46.666	1	099.04			
46.758	8	098.77		O_{23}4	P_2 12]
46.829	8	098.56		P_{23}10	P_2 13]
46.894	1	098.38			
46.974	1	098.14			
47.051	8	097.92		P_{23}11	
47.133	8	097.68	Q_{12}7		
47.226	4	097.41		[illegible]12	
47.314	5	097.15		P_{23}13	

λ	I	ν	Classification 10-6		
5847.400	1	17 096.90			
47.483	2	096.65			
47.522	10b	096.54	Q_1 7		
47.885	1	095.48			
47.984	6	095.19	R_1 2		
48.062	1	094.96			
48.158	5	094.68	Q_{12}6		
48.272	1	094.35			
48.381	9	094.03		O_{23}5	
48.464	1	093.78			
48.550	10	093.53	Q_1 6		
49.038	2	092.11			
49.166	9	091.73	Q_{12}5		
49.291	1	091.37			
49.407	2	091.03			
49.504	10	090.74			
49.550	10	090.61	Q_1 5		
49.694	1	090.19			
49.798	8	089.89	R_1 1		
49.941	6	089.47		O_{23}6	
50.027	1	089.22			
50.149	6	088.85	Q_{12}4		
50.414	2	088.0[illegible]			
50.503	10	087.83	Q_1 4		
50.546	10	087.70	Q_1 4		
50.685	1	087.30			
50.818	2	086.91			
50.933	1	086.57			
51.019	2	086.32			
51.119	9	086.03	Q_{12}3		
51.221	1	085.72			
51.321	2	085.44			
51.434	10	085.10		O_{23}7	
51.480	10	084.97	Q_1 3		
51.570	5	084.71	R_1 0		
51.643	1	084.5[illegible]			
51.919	1	083.69			
52.063	8	083.27	Q_{12}2		
52.169	1	082.96			
52.310	1	082.55			
52.414	10	082.24	Q_1 2		
52.566	1	081.80			
52.688	[illegible]	081.45			
52.770	6	081.21	P_{12}13		
52.861	7	080.94		O_{23}8	
52.937	1	080.72			
53.003	5	080.53	Q_{12}1		
53.058	5	080.37	P_{12}12		
53.177	7	080.02	P_1 13		
53.286	10	079.70	P_{12}11		
53.317	10	079.61	Q_1 1		
53.385	2	079.41			
53.443	3	079.24	P_1 12		
53.478	8	079.14	P_{12}10		
53.528	1	078.96	P_{13}12		

λ	I	ν	Classification 10-6		Classification 9-5
5853.593	2	17 078.80			
53.646	10	078.65	P_{12}9		
53.697	9	078.50	P_1 11		
53.770	6	078.29	P_{12}8	P_{13}11]	
53.824	3	078.13			
53.873	10	077.99	P_{13}7	P_1 10]	
53.941	6	077.79	P_{12}6		
53.972	10	077.7[illegible]	P_{13}10		
53.997	10	077.63	P_{12}5		
54.061	10b	077.44	P_{12}1-4	P_1 9]	
54.118	3	077.27	P_{13}9		
54.168	7	077.13	P_1 8	Q_1 0]	
54.220	5	076.97		O_{23}9	
54.260	9	076.86	P_1 7	P_{13}8]	
54.329	10	076.66	P_1 6	P_1 0]	
54.399	10b	076.45	$P_1$1-5		
54.617	1	075.82			
55.089	1	074.44			
55.297	1d	073.84			
55.513	5	073.21		O_{23}10	
55.629	1	072.87			
55.776	9	072.44	O_{12}1		
55.958	1	071.91			
56.461	2	070.44			
56.582	2	070.09			
56.675	7	069.81	O_{12}2	O_{13}1]	
56.715	7	069.70		O_{23}11	
56.802	1	069.45			
56.923	1	069.10			
57.063	2	068.69			S_{32}11
57.210	2	068.26			T_{31}7
57.328	3	067.92	O_{13}2		
57.470	2	067.50	N_{13}2		
57.584	10	067.17	O_{12}3		
57.677	1	066.90			
57.774	1	066.62			
57.860	3	066.37		O_{23}12	
58.000	1	065.96			
58.087	1	065.71			
58.148	4	065.53	O_{13}3		
58.219	1	06[illegible].32			
58.361	1	0[illegible]4.91			
58.471	9	064.59	O_{12}4		
58.606	1	064.19			
58.741	1	063.80			
58.831	1	063.54			
58.919	3	063.28		O_{23}13	
59.005	3	063.03	O_{13}4		
59.119	2	062.70			
59.228	4	062.38	N_{13}3		
59.351	10b	062.02	O_{12}5		
59.558	1b	061.42			S_{32}10
59.738	1	060.90			
59.866	6	060.52	O_{13}5		
60.051	2d	059.98			

λ	I	ν	Classification 10-6		9-5		λ	I	ν	Classification 10-6	9-5	
5860.210	9	17 059.52	$O_{12}6$				5867.214	2	17 039.16		$R_{2}15$	
60.337	1	059.15				$T_{31}6$	67.290	1	038.94			
60.512	2	059.64					67.391	1	038.64			
60.6'9	1	058.33					67.536	1	038.22			
60.725	4	058.02	$O_{13}6$				67.614	1	038.00			
60.817	2	057.76		$O_{23}15$			67.675	4	037.82		$S_{21}9$	
60.930	1	057.43					67.815	1	037.41			
51.011	2	057.19	$N_{13}4$				67.935	3	037.06			
61.053	10	057.06	$O_{12}7$				68.066	2	036.68			
61.342	1	056 23					68.171	4	036.38	$N_{13}8$		$R_{32}12$
61.464	1	055.87					68.329	3	035.92			
61.553	5	055.61	$O_{13}7$				68.414	1	035.67			
61.722	1	055.12					68.525	5	035.35			$S_{32}6$
61.877	8	054.67	$O_{12}8$				68.669	2	034.93			$R_{3}12$
61.955	2	054.44				$S_{32}9$	68.775	1	034.63			
62.057	1	054.15					68.929	5	034.18		[$S_{31}6$	$T_{31}3$
62.184	1	053.78			$S_{21}11$		69.086	1	033.72			
62.273	2	053.52					69.281	2	033.16		$R_{2}14$	
62.380	4	053.21	$O_{13}8$			$S_{31}9$	69.404	1	032.80			
62.506	2	052.84					69.507	1	032.50			
62.673	10	052.36	$O_{12}9$				69.667	2	032.04		$R_{21}14$	
62.818	5	051.93	$N_{13}5$				69.776	4	031.72			$R_{32}11$
62.921	1	051.63					69.856	1	031.49			
63.054	1	051.25					69.938	5	031.25	$N_{13}9$		
63.155	3	050.95	$O_{13}9$				70.011	2	031.04			
63.236	1	050.72					70.144	1	030.65			
63.312	3	050.50				$T_{31}5$	70.264	5	030.30			$R_{3}11$
63.439	6	050.13	$O_{12}10$				70.317	2	030.15		$S_{22}8$	
63.585	1	049.70					70.386	1	029.95			
63.735	2d	049.27					70.469	7	029.71			$S_{32}5$
63.931	3	048.70	$O_{13}10$				70.602	1	029.32			
64.052	1	048.34					70.738	1	028.93			
64.172	9	048.00	$O_{12}11$				70.860	3	028.58			$S_{31}5$
64.263	2	047.73				$S_{32}8$	70.962	1	028.28			
64.488	1d	047.08					71.071	1	027.96			
64.626	4	046.68	$O_{13}11$	$N_{13}6$]			71.168	1	027.68			
64.741	2	046.34					71.260	4	027.42		$R_{2}13$	$R_{32}10$
64.870	4	045.97	$O_{12}12$				71.383	1	027.06			
64.995	1	045.60			$S_{21}10$		71.530	4	026.63			$T_{31}2$
65.198	0	045.01				$R_{3}14$	71.598	1	026.44			
65.364	1	044.53	$O_{13}12$				71.666	4	026.24	$N_{13}10$	$R_{21}13$	
65.524	5	044.07	$O_{12}13$				71.747	3	026.00			$R_{3}10$
65.688	1	043.59					72.163	1	024.80			
65.806	3	043.25					72.294	6	024.42			$S_{32}4$
65.918	2	042.92					72.363	3	024.22		$R_{1}15$]	
66.015	2	042.64	$O_{13}13$				72.523	1	023.75			
66.159	3	042.22	$O_{12}14$			$T_{32}4$	72.642	5	023.41		[$R_{33}9$	$S_{31}4$
66.283	1	041.86					72.771	2	023.03			
66.398	5	041.53	$N_{13}7$				72.858	5	022.78		$S_{21}7$	
56.451	5	041.37				$S_{32}7$	72.999	1	022.37			
66.586	1	040.98					73.127	6	022.00			$R_{3}9$
66.706	2	040.63	$O_{12}15$				73.245	1	021.66			
66.832	1	040.27				$S_{31}7$	73.360	2	021.33	$N_{13}11$		
66.980	2	039.84				$R_{3}13$	73.584	2	020.68		$R_{21}12$	
67.086	1	039.53					73.757	1d	020.18			

λ	I	ν	Classification 10-6	Classification 9-5		
5873.902	4	17 119.76				$R_{32}8$
73.982	10	119.52				$T_{31}1$
74.105	1	119.17				
74.254	1	118.74				
74.342	5	118.48				$S_{32}3$
74.395	5	118.33				R_3 8
74.552	1	117.87				
[illegible]	[illegible]	117.50				$S_{31}3$
74.911	2	116.83				
75.042	8	116.4[illegible]	$N_{13}12$		R_2 11	$R_{32}7$
75.193	1	116.02				
75.335	4	115.61			$S_{21}6$	
75.424	4	115.35			$R_{21}11$	
75.541	9	115.01			[$S_{32}2$	R_3 7
75.766	1	014.36				
75.879	3	014.03				$S_{31}2$
75.979	2	013.74				
76.068	6	013.48				$R_{32}6$
76.155	1	013.23				
76.236	5	013.00				$T_{31}0$
76.350	1	012.67				
76.478	2	012.30				
76.583	5	011.99				R_3 6
76.680	1	011.71	$N_{13}13$			
76.777	3	011.43			R_2 10	
76.849	1	011.22				
76.932	10	010.98				$S_{32}1$
76.961	10	010.89		R_1 13		$R_{32}5$
77.084	1	010.54				
77.180	4	010.26			$R_{21}10$	
77.248	4	010.07				$S_{31}1$
77.343	1	009.79				
77.402	3	009.62				
77.489	8	009.37				R_3 5
77.630	2	008.96				
77.729	9	008.68			$S_{21}5$	$R_{32}4$
77.831	1	008.38				
77.930	2	008.09				
78.024	1	007.82				
78.123	2	007.53				
78.257	5	007.15				R_3 4
78.335	8	006.92				$R_{32}3$
78.453	4	006.58			R_2 9	
78.559	1	006.27				
78.704	2	005.85				
78.800	3	005.58				$R_{32}2$
78.860	6	005.40			$R_{21}9$	
78.914	6	005.25				R_3 3
78.995	1	005.01				
79.096	1	004.71				
79.198	4	004.42		R_1 12		
79.323	2	004.06				
79.449	3	003.70				R_3 2
79.627	1	003.18				
79.779	2	002.74				

λ	I	ν	Classification 9-5		
5879.932	1	17 002.30			
80.067	9	001.91	[R_2 8	$S_{21}4$	Q_3 14
80.332	1	001.15			$Q_{32}13$
80.465	4	000.76		$R_{21}8$	
80.556	2	000.50			
80.650	2	000.23			
80.739	1	16 999.97			
80.819	5	999.74			Q_3 13
80.953	1	999.35			$Q_{32}12$
81.130	1	998.84			
81.385	5	998.10	R_1 11		
81.484	3	997.81			Q_3 12
81.600	6	997.48		R_2 7	$Q_{32}3$
81.715	2	997.15			
81.860	2	996.73			
81.998	10	996.33		$R_{21}7$	
82.032	10	996.23			Q_3 11
82.111	1	996.00			
82.188	5	995.78			Q_3 3
82.322	8	995.39		$S_{21}3$	$Q_{32}9$
82.401	2	995.17			$Q_{32}5$
82.484	5	994.93			Q_3 10
82.547	1	994.74		[$Q_{32}8$	$Q_{32}6$
82.619	6	994.54		[$Q_{32}7$	Q_3 4
82.706	1	994.26			
82.814	9	993.97			Q_3 9
82.870	3	993.81			
82.922	8	993.66			Q_3 5
82.974	3	993.51			
83.030	9	993.35			Q_3 8
83.076	3	993.21		R_2 6	Q_3 6
83.115	10	993.10			Q_3 7
83.295	1bd	992.58			
83.446	6	992.15		$R_{21}6$	
83.524	4	991.92	R_1 10		
83.623	1	991.63			
83.844	1	991.00			
83.937	2	990.73			
84.038	1	990.44			
84.104	2	990.25			
84.171	3	990.05			
84.257	1	989.81			
84.348	2	989.54			
84.437	5	989.29		R_2 5	
84.505	5	989.09		$S_{21}2$	
84.650	2d	988.67			
84.753	1	988.37			
84.831	10	988.15		$R_{21}5$	
84.953	1	987.80			
85.041	1	937.54			
85.119	5	987.32			
85.227	1	987.00			
85.364	2	986.61			
85.516	1	986.17			
85.619	9	985.87	R_1 9		

Cap in the measurements which contains the following strong bands (P_1 head).

λ	I	λ	Band
5906.00	6	16 927.24	9-5
5959.01	6	16 776.68	8-4
6013.54	7	16 624.54	7-3

λ	I	ν	Band
6069.66	7	16 470.85	6-2
6127.33	3	16 315.81	5-1

λ	I	ν	Classification 5-1	4-0		12-9		
6146.615	5	16 264.63			R_3 11			S_{32}5
46.741	1	264.29						
46.841	6	264.02			S_{32}5			
47.004	3	263.60						S_{31}5
47.071	3	263.41						
47.195	1bd	263.09						R_{31}10
47.318	2bd	262.76			S_{31}5			R_3 10
47.556	1	262.13						
47.660	2bd	261.86						
47.805	3d	261.48	N_{12}10		R_{32}10			
47.900	2d	261.22						T_{31}2
47.993	1d	260.98						
48.061	3d	260.80			T_{31}2			
48.220	1bd	260.38						
48.347	3	260.04			R_3 10			
48.426	3	259.83						R_{42}9
48.577	4	259.43						S_{32}4
48.698	1	259.12						
48.822	2	258.79						R_{41}9
48.952	7b	258.44		S_{21}7	S_{32}4		[R_3 9	S_{31}4
49.124	1	257.98						
49.252	2	257.65						
49.335	2	257.43					S_{32}7	
49.413	4	257.23			S_{31}4			
49.752	1d	256.33						
49.880	4	255.99	N_{12}11					R_{32}8
49.955	4	255.79			R_3 9			
50.054	2	255.53						
50.250	2	255.01						
50.324	2	254.82						R_{31}8
50.424	5	254.55					[R_5 8	S_{32}3
50.504	2	254.33						T_{31}1
50.647	1	253.96						
50.718	1	253.78						
50.802	3	253.55						S_{31}3
50.875	1	253.36			R_{32}8			
50.953	8	253.15		[T_{31}1	S_{32}3		R_2 11	
51.214	?	252.47						R_{32}7
51.295	1	252.25						
51.376	4	252.04			S_{31}3		R_{21}11	
51.446	2	251.85			R_3 8			
51.529	1	251.63						
51.614	4	251.41		R_3 11				R_{41}7
51.745	3	251.06						R_4 7
51.802	3	250.91		S_{21}6				
51.870	1	250.73						
51.959	2	250.50						
52.055	4	250.24		R_{21}11			S_{21}6	
52.109	4	250.10						S_{32}2
52.204	5	249.85			R_{32}7			
52.386	2	249.37						R_{32}6
52.471	1	249.14						S_{31}2
52.567	1	248.89						
52.661	1	248.64						
52.772	8	248.35		[S_{32}2	R_3 7			

λ	I	ν	Classification 4-0			12-9		
6152.864	1	16 248.11						T_{31}0
52.936	4	247.91						R_3 6
53.159	2	247.33			S_{31} 2			
53.296	1	246.97						
53.481	8	246.66			R_{32}6		R_{21}10	R_{32}5
53.503	1	246.42						
53.591	7	246.19		R_2 10	T_{31}0			S_{32} 1
53.730	2	245.82						
53.837	1	245.53			R_{31}6			R_{31}5
53.915	1	245.33						S_{31} 1
53.971	7	245.18			R_3 6			R_3 5
54.074	2	244.91		R_{21}10				Q_3 15
54.184	2	244.62						
54.293	4	244.33						R_{32}4
54.434	9	243.96		[R_{32}5	S_{32} 1			
54.578	5	243.58		S_{21} 5				
54.685	4	243.30					S_{21} 5	
54.777	2	243.06			S_{31} 1			
54.874	2	242.80			R_{31}5			R_3 4
54.935	1	242.64					R_3 9	
54.990	4	242.49						R_{32}3
55.035	6	242.37			R_3 5			
55.124	1	242.14						
55.235	3	241.84						Q_3 14
55.345	6	241.55			R_{32}4		R_{21}9	
55.428	1	241.34						
55.527	4	241.08		R_2 9		R_1 12		R_{32}2
55.614	3	240.85						R_3 3
55.746	3	240.50			R_{31}4			
55.812	1	240.33						
55.881	1	240.14						R_{31}2
55.938	2	239.99			R_3 4			
55.995	5	239.84		R_{21}9				
56.066	6	239.65			R_{32}3			
56.174	1d	239.37						
56.271	3	239.11						Q_3 13
56.369	?	238.85						
56.474	3·	238.58			R_{31}3			
56.597	3d	238.25			R_{32}2			
56.715	6	237.94			R_3 3		R_2 8	
56.834	1	237.63						
56.923	3	237.40						
57.005	1	237.18			R_{31}2			
57.105	1	236.91						
57.196	5	236.68					R_{21}8	Q_3 12
57.277	3	236.46		S_{21} 4				
57.382	3	236.18		R_2 8	R_3 2			
57.680	1	235.40						
57.761	3	235.18						
57.856	2	234.93		R_{21}8				
57.955	5	234.67						Q_3 11
58.030	3	234.47				R_1 11		Q_{32}10
58.168	1	234.11			Q_3 14			
58.283	1	233.81						
58.386	3	233.54	R_1 11					

λ	I	ν	Classification 4-0			12-9		
6158.444	1	16 233.38						Q_{32}3
58.508	2	233.22					R_2 7	
58.599	3	232.98					[Q_{32}9	Q_3 10
58.713	1	232.68						
58.847	1	232.32						Q_{32}4
58.947	7	232.06					R_{21}7	Q_{32}7
59.033	3	231.83			Q_3 13			Q_3 3
59.117	7	231.61						Q_3 9
59.164	6	231.49		R_2 7				Q_{32}6
59.221	1	231.34						Q_{32}5
59.340	1d	231.02						
59.482	5	230.65					[Q_3 8	Q_3 4
59.602	6	230.33		R_{21}7				
59.687	8	230.11				[S_{21} 3	[Q_3 7	Q_3 5
59.766	5	229.90			Q_3 12			Q_3 6
59.825	2	229.75			Q_{32}11			
59.886	7	229.58		S_{21} 3	Q_{32}3			
59.981	1	229.33						
60.089	3	229.05						
60.169	1	228.84					$R_2$6	
60.282	3	228.54						
60.394	6	228.25			Q_3 11			
60.479	2	228.02				R_1 10		
60.579	4	227.76			Q_3 3		R_{21}6	
60.733	2	227.35			Q_{32}9			
60.822	5	227.12	R_1 10	R_2 6	Q_{32}5			
60.909	3	226.89			Q_3 10			
60.985	2	226.69			Q_{32}8			
61.064	4	226.48		[Q_3 4	Q_{32}7		Q_2 13	
61.162	1	226.22						
61.285	8	225.90		R_{21}6	Q_3 9			
61.410	6	225.57			Q_3 5			
61.533	4	225.24			Q_3 8			
61.639	8	224.96		[Q_3 6	Q_3 7			
61.727	2	224.74					R_2 5	
61.941	1	224.17						
62.022	2	223.96					S_{21} 2	
62.153	7	223.61					R_{21}5	
62.320	1	223.17					Q_2 12	
62.420	6	222.91	[S_{21} 2	R_2 5				
62.565	1	222.53						
62.665	3	222.26						
62.769	1	221.99						
62.863	9	221.74		R_{21}5		R_1 9		P_3 4
62.970	3	221.46						
63.121	1	221.07					Q_{21}12	
63.201	6	220.85	R_2 9				Q_{23}12	
63.314	1	220.56						
63.427	3	220.26					Q_2 11	
63.509	3	220.04		Q_2 13				
63.612	4	219.7					R_{21}4	
63.732	1	219.45						
63.856	3	219.13					Q_{21}11	
63.949	3	218.88					Q_{23}11	
64.034	3	218.66						

λ	I	ν	Classification 4-0			12-9		
6164.131	3	16 218.41						
64.264	6	218.06					S_{22} 1	P_3 5
64.369	7	217.78						
64.442	1	217.59					Q_2 10	
64.518	3	217.39		Q_2 12				
64.592	1	217.19					R_2 3	
64.746	2	216.79						
64.861	7	216.49		S_{21} 1	P_3 4		Q_{21}10	
64.981	8	216.17					Q_{23}10	R_{21}3]
65.090	1	215.88		Q_{23}12				
65.202	4	215.59				R_1 8		
65.336	6	215.24					Q_2 9	
65.383	4	215.11						
65.476	4	214.87		Q_2 11				P_3 6
65.551	4	214.67	R_1 8					
65.653	4	214.40						
65.783	8	214.06		R_{21}3			Q_{21}9	
65.671	3	213.83					Q_{23}9	
65.930	2	213.67						
65.997	2	213.50						
66.050	3	213.36		Q_{23}11				
66.151	4	213.09					Q_2 8	
66.258	3	212.81					R_{21}2	
66.356	4	212.55		Q_2 10				
66.446	1	212.32						
66.539	4	212.07			P_3 5		Q_{21}8	P_3 7
66.688	2bd	211.68					Q_{23}8	
66.861	5	211.23					Q_2 7	
66.956	1	210.98						
67.029	3	210.78						
67.118	8	210.55		Q_2 9	R_{21}2]			
67.200	1	210.34		S_{21} 0				
67.302	5	210.07					Q_{21}7	
67.405	5	209.80					Q_{23}7	
67.472	8	209.62				R_1 7	$Q_2$6, R_{21}1	P_3 8
67.568	2	209.37		Q_{21}9				
67.671	2	209.10		Q_{23}9				
67.738	3	208.92	Q_1 15					
67.802	3	208.75		Q_2 8				
67.861	7	208.60	R_2 7					
67.934	1	208.41					Q_{21}6	
68.003	5	208.23			P_3 6		Q_2 5	Q_{23}6]
68.112	1	207.94						
68.188	3	207.74						P_3 9
68.239	2	207.47		Q_{21}8				
68.396	8b	207.19	[R_{21}1	Q_{23}8	Q_2 7]		Q_2 4	Q_{21}5]
68.481	1	206.97					R_{21}0	
68.575	5	206.75					Q_{23}5	
68.689	5	206.42						
68.772	2	206.20					Q_2 3	P_3 10
68.846	5	206.01		Q_{21}7			Q_{21}4	
68.925	3	205.80		Q_2 6				
68.978	5	205.66		Q_{23}7			Q_{23}4	
69.021	4	205.55					Q_2 2	
69.097	1	205.35						

λ	I	ν	Classification 4-0			12-9		
6169.171	3	16 205.16					Q_2 1	Q_{21}3]
69.233	2	204.99						P_3 1
69.279	5	204.87			P_3 7			
69.378	8b	204.61		Q_2 5	Q_{21}6]		Q_{23}3	Q_{21}2]
69.500	4	204.27	[R_{21}0	Q_{23}6			Q_{21}1	
69.567	2	204.12						
69.629	4	203.95						
69.722	7	203.71		Q_2 4		R_1 6	Q_{23}2	
69.805	5	203.49		Q_{21}5				
69.882	2	203.29						
69.955	7	203.10		Q_{23}5				
69.996	4	202.99		Q_2 3				
70.057	1	202.83						
70.142	8	202.61	R_2 6	Q_{21}4			Q_{23}1	
70.260	3	202.30						
70.327	4	202.12		Q_{23}4				
70.420	6	201.88		Q_{21}3	P_3 8			
70.501	1	201.66						
70.574	2	201.47		Q_{21}2				
70.651	7	201.27		Q_{23}3				
70.745	4	201.02	Q_1 13	Q_{21}1				
70.825	2	200.81						
70.941	4	200.51		Q_{23}2				
71.023	1	200.29						
71.136	1	200.00						
71.352	7	199.43		Q_{23}1				
71.421	4	199.25			P_3 9			
71.547	1d	198.92						
71.778	7	198.31					P_{23}2	
71.889	6	198.02				R_1 5		
71.968	1	197.81					P_2 3	
72.044	3	197.61						
72.169	4	197.29	Q_1 12					
72.273	2	197.01			P_3 10			
72.374	8	196.75	R_2 5					
72.474	1	196.48						
72.576	6	196.22					P_{23}3	
72.723	1	195.83				Q_{12}10		
72.886	1	195.40						
72.988	4	195.14			P_3 11			
73.074	1	194.91	Q_{12}11					
73.159	1	194.69						
73.241	6	194.47				Q_1 10		
73.235	7	194.36		P_{23}2			P_{23}4	
73.379	1	194.11						
73.472	1	193.87						
73.537	6	193.69	Q_1 11		P_3 12			
73.764	1	193.10						
73.890	7	192.77					P_{23}5	P_2 6]
73.958	1	192.59			P_3 13			
74.030	5	192.40				R_1 4		
74.101	1	192.22						
74.185	8	192.00		P_{23}3		Q_{12}9		
74.286	1	191.73						
74.366	2	191.52					P_2 7	

λ	I	ν	Classification 4-0			12-9		
6174.435	5	16 191.34					$P_{23}6$	
74.522	1	191.11						
74.597	8	190.92	R_1 4					
74.642	8	190.80				Q_1 9	$O_{23}3$	
74.743	2	190.53					P_2 8	
74.860	8	190.23	Q_1 10					
74.900	8	190.12					$P_{23}7$	
74.979	1	189.91					P_2 9	
75.044	7	189.74		$P_{23}4$				
75.126	1	189.53					P_2 13	
75.194	1	189.35					P_2 10	
75.262	6	189.17				[P_2 11	$P_{23}8$	P_3 12]
75.350	1	188.94						
75.434	3	188.72						
75.534	7	188.46				$Q_{12}8$	$P_{23}9$	
75.660	4	188.13	$Q_{12}9$	P_2 5			$P_{23}13$	
75.705	4	188.01					$P_{23}10$	
75.788	4	187.79					$P_{23}11$	
75.867	9	187.59		$P_{23}5$				
75.970	6	187.32				Q_1 8		
75.050	2	187.11		P_2 6				
76.132	10	186.89	Q_1 9			R_2 3		
76.295	2	186.46						
76.365	1	186.28						
76.424	3	186.13					$O_{23}4$	
76.513	4	185.89		$O_{23}3$				
76.618	6	185.62		$P_{23}6$				
76.719	3	185.35		P_2 7				
76.804	8	185.13	R_1 3			$Q_{12}7$		
76.919	3	184.83	$Q_{12}8$					
76.986	2	184.65						
77.127	1	184.28						
77.253	9	183.95				Q_1 7		
77.299	9	183.83		$P_{23}7$				
77.377	8	183.63	Q_1 8					
77.506	1	183.29						
77.632	1d	182.96						
77.742	2	182.67						
77.838	2	182.42		P_2 9				
77.890	5	182.29		$P_{23}8$				
77.992	2	182.02						
78.075	5	181.80				$Q_{12}6$	$O_{23}5$	
78.121	5	181.68	$Q_{12}7$					
78.187	3	181.51				R_2 2		
78.270	2	181.29		P_2 10				
78.343	1	181.10						
78.408	6	180.93		$P_{23}9$				
78.497	6	180.70				Q_1 6		
78.581	9b	180.48	Q_1 7	P_2 11	$O_{23}4$]			
78.725	1	180.10						
78.840	3	179.80		$P_{23}10$				
78.898	1	179.65		P_2 12				
78.979	4	179.43	R_1 2					
79.055	2	179.23		P_2 13				
79.118	1	179.07		P_2 14				

λ	I	ν	Classification 4-0			Classification 12-9		
6179.181	4	16 178.90		$P_{23}11$				
79.270	5	178.67				$Q_{12}5$		
79.310	4	178.57	$Q_{12}6$					
79.441	3	178.22		$P_{23}12$				
79.603	1	177.80		$P_{23}13$				
79.684	9	177.59				$Q_1 5$	$O_{23}6$	
79.762	8	177.38	$Q_2 6$					
79.947	1	176.90						
80.029	2	176.68						
80.106	1	176.48						
80.195	4	176.25				$R_1 1$		
80.270	1	176.05						
80.350	1	175.84						
80.452	6	175.58	$Q_{12}5$			$Q_{12}4$		
80.524	6	175.39		$O_{23}5$				
80.621	1	175.14						
80.698	1	174.93						
80.765	2	174.76						
80.835	6	174.57				$Q_1 4$		
80.910	10	174.38	$Q_2 5$					
81.026	2d	174.08						
81.138	6	173.78	$R_2 1$					
81.188	5	173.65					$O_{23}7$	
81.336	1	173.26						
81.448	1	172.97						
31.540	4	172.73				$Q_{12}3$		
81.603	4	172.57	$Q_{12}4$					
81.688	1	172.34						
81.762	1	172.15						
81.846	3	171.93				$P_{12}13$		
81.947	8	171.66				$Q_1 3$		
82.038	8	171.43	$Q_1 4$					
82.136	2	171.17				$R_1 0$		
82.262	4	170.84				$P_1 13$		
82.352	1	170.61				$P_{12}12$		
82.429	4	170.40		$O_{23}6$				
82.509	2	170.20						
82.626	4	169.89				$Q_{12}2$	$O_{23}8$	
82.725	6	169.63	$Q_{12}3$					
82.827	5	169.36				$P_{12}11$	$P_1 12]$	
82.925	1	169.11						
83.012	5	168.[illegible]				$Q_1 2$		
83.148	10	168.52	$Q_1 3$					
83.262	5	168.23	$R_1 0$			$P_{12}10$	$P_1 11]$	
83.363	1	167.96						
83.482	2	167.65						
83.590	6	167.37				$P_{12}9$		
83.687	5	167.11				$Q_{12}1$	$P_1 10]$	
83.765	1	166.91						
83.830	3	166.74	$Q_{12}2$					
83.879	4	166.61				$P_{12}8$		
83.936	4	166.46					$O_{23}9$	
84.030	8	166.22				$Q_1 1$	$P_1 9]$	
84.134	7	165.95				$P_{12}7$		
84.249	7	165.64	$Q_1 2$					

λ	I	ν	Classification 4-0			12-9		
6184.289	5	16 165.54		$O_{23}7$				
84.336	6	165.42				$P_{12}6$	P_1 8]	
84.430	1	165.17				$P_{13}8$		
84.502	7	164.98				$P_{12}5$		
84.569	5	164.81				P_1 7		
84.638	5	164.63				$P_{12}4$		
84.737	7	164.37				$P_{12}3$		
84.796	4	164.22				$P_{12}2$		
84.847	5	164.08	$P_{12}15$			$P_{13}1$		
84.929	7	163.87	$Q_{12}1$			P_1 5		
84.984	1	163.73				Q_3 0		
85.048	4	163.56				P_1 4		
85.131	7	163.34	$P_{12}14$			P_3 3	$O_{23}10$	
85.185	6	163.20				$P_1$1,2		
85.244	1	163.04				$P_{13}4$		
85.308	8	162.88	Q_1 1					
85.430	2	162.56	$P_{12}13$					
85.589	1	162 14						
85.681	2	161.90	$P_{12}12$					
85.800	2	161.59				$P_{13}1$		
85.887	6	161.36	$P_{12}11$	P_2 13]				
85.956	1	161.18						
86.032	7	160.99	$P_{12}10$	$O_{23}8$				
86.091	1	160.83						
86.152	8	160.68	P_1 12	$P_{12}9$				
86.235	8	160.46	$P_{12}8$					
86.310	10bb	160.26	P_1 11	P_{12}1-7]	Q_1 0]			
86.421	2	159.97						
86.498	5	159.77	P_1 10					
86.555	2	159.62						
86.620	9	159.45	$P_1$0,9					
86.662	8	159.34	$P_1$1,8					
86.703	9	159.23				$O_{12}1$		
86.753	10bb	159.10	$P_1$2-7					
86.909	3	158.70						
87.030	1	158.36						
87.150	3	158.06						
87.242	1	157.82						
87.321	1	157.62					$O_{23}12$	
87.446	1	157.29						
87.543	2	167.04						
87.651	3	156.76				$O_{13}2$	$O_{11}1$]	
87.721	5	156.58		$O_{23}9$				
87.868	1	156.19						
87.927	2	156.04						
88.262	7	155.16	$O_{12}1$				$O_{23}13$	
88.339	2	154.96				$O_{13}2$		
88.472	1	154.61						
88.576	7	154.34				$O_{12}3$		
88.684	1	154.06						
89.193	2	152.73				$O_{13}3$		
89.308	1	152.43		$O_{23}10$				
89.376	5	152.25	$O_{12}2$					
89.473	5	152.00				$O_{12}4$		
89.822	1d	151.09						

λ	I	ν	Classification 4-9		12-9		11-8
6190.065	2	16 150.46	$O_{13}2$		$O_{13}4$		
90.154	2	150.22					
90.336	9	149.75	$N_{13}2$		$O_{13}5$	$N_{13}3]$	
90.412	1	149.55					
90.484	9	149.37	$O_{13}3$				
90.577	3	149.12					
90.739	1	148.70					
90.830	4	148.46		$O_{23}11$			
90.906	4	148.26			$O_{13}5$		
91.034	1	147.93					
91.154	5	147.62	$O_{13}3$		$O_{23}6$		
91.322	1	147.18					
91.438	2bd	146.87					$T_{31}9$
91.586	5	146.49	$O_{13}4$				
91.720	2	146.14			$O_{13}6$		
91.855	2	145.79					$S_{32}13$
91.959	5	145.52			$O_{13}7$		
92.083	1	145.19					
92.217	3	144.84	$O_{13}4$		$N_{13}4$		
92.275	2	144.69		$O_{33}12$			
92.367	1	144.45					
92.495	4	144.12	$N_{13}3$		$O_{13}7$		
92.585	1	143.88					
92.693	10	143.60	$O_{13}5$		$O_{13}8$		
92.837	1	143.23					
92.970	2d	142.88					
93.150	1	142.41					
93.218	3	142.23			$O_{13}8$		
93.288	4	142.05	$O_{13}5$				
93.413	5	141.73			$O_{12}9$		
93.500	1	141.50					
93.603	2	141.23					
93.711	4	140.95		$O_{23}13$			
93.779	6	140.77	$O_{12}6$				
93.868	1	140.54					
93.951	2	140.32			$O_{13}9$		
94.082	4	139.98			$O_{12}10$	$N_{13}5]$	
94.253	1	139.52					
94.365	2	139.24	$O_{13}6$				
94.504	1	138.88					
94.592	1	138.65					
94.676	5	138.43	$N_{13}4$		$O_{13}11$		
94.768	1	138.20					
94.854	9	137.97	$O_{12}7$				
94.992	1	137.61					$S_{32}12$
95.096	1	137.34					
95.219	2d	137.02			$O_{13}11$		$T_{31}8$
95.428	3	136.48	$O_{13}7$				
95.503	2	136.28					
95.607	1	136.01					
95.714	2	135.73					
95.817	1	135.46					
95.911	5	135.22	$O_{12}8$				
96.009	1	134.96					
96.138	2	134.63					

λ	I	ν	Classification 4-0	12-9	11-8	
6196.254	1	16 134.32				
96.369	1	134.03				
96.473	3	133.75	$O_{13}6$			
96.758	1	133.01				
96.879	3	132.70	$N_{13}5$			
96.946	7	132.52	$O_{12}9$			
97.076	1	1[illegible]2.18				
97.102	2	131.91			$S_{21}13$	
97.305	1	131.59				
97.423	4	131.28				
97.591	2	131.08	$O_{13}9$			
97.641	1	130.71				
97.757	2	130.41		$N_{13}7$		
97.847	1	130.16				
97.939	4	129.94	$O_{12}10$			
98.039	[illegible]	129.68				$S_{32}11$
98.178	1	129.32				
98.415	1	128.70				
98.533	1d	128.39				
98.802	2	127.69				$T_{31}7$
98.908	5	127.42	$O_{12}11$			
99.000	1	127.18				
99.093	3	126.94	$N_{13}6$			
99.229	2	126.58				
99.298	1	126.40				
99.386	1	126.17				
99.496	2bd	125.89				
99.677	3	125.42				
99.829	4	125.02	$O_{12}12$			
99.938	2	124.74				
6200.271	2	123.87				
00.376	2	123.60				
00.472	1	123.35				
00.579	1	123.07			$S_{21}12$	
00.715	3	122.72	$O_{12}13$			
00.815	1	122.46				
00.910	5	122.21				$S_{32}10$
01.052	2	121.84				
01.158	1	121.57				
01.310	4	121.17	$N_{13}7$			$S_{31}10$
01.472	1	120.75				
01.576	1	120.48				
01.736	4	120.06				
01.857	1	119.75				
02.187	1	118.89				
02.322	3	118.54				$T_{31}6$
02.515	2	118.04				
02.796	2	117.31				
03.013	1	116.74				
03.144	2	116.40				
03.28[illegible]	2	116.04				
03.377	1	115.80				
03.479	3	115.53	$N_{13}8$			$R_{32}15$
03.599	1	115.22				
03.705	4	114.94				$S_{32}9$

λ	I	ν	4-0	Classification 11-8		
6203.792	1	16 114.72				
03.883	2	114.48			$S_{21}11$	
04.001	3	114.18				$R_3 15$
04.141	2	113.81				$S_{31}9$
04.320	1	113.35				
04.647	1	112.50				
04.768	2	112.19				
04.914	1	111.81				
0[illegible].057	1	111.43				
05.316	1	110.76				
05.419	1	110.49				
05.509	1	110.26				
05.571	1	110.10				
05.646	2	109.91				$T_{31}5$
05.733	2	109.68	$N_{13}9$			$R_{32}8$
05.937	2	109.15				
06.023	1d	108.93				
06.191	1	108.49				
06.272	2	108.28				$R_3 14$
06.344	2	108.09				$S_{32}8$
06.424	2	107.89				
06.596	1	107.44				
06.694	3	107.19				
06.778	1	106.97				$S_{31}8$
06.856	1	106.77				
06.944	2	106.54				
07.075	3	106.20			$S_{21}10$	
07.415	1	105.31				
07.533	1	105.01				
07.744	1	104.46				
07.916	2	104.01				$R_{32}13$
08.104	1	103.53				
08.254	1	103.14				
08.343	1	102.91				
08.443	5	102.65			$R_2 15$	$R_3 13$
08.705	1d	101.97				
08.852	7	101.59			$T_{31}4$	$S_{32}7$
09.282	2	100.47				$S_{31}7$
09.454	1	10[illegible]				
09.707	1	099.3[illegible]				
09.827	1	099.06				
09.967	3	098.70				$R_{32}12$
10.054	1	098.47				
10.192	3	098.11			$S_{21}9$	
10.370	1	097.55				$R_{31}12$
10.497	2	097.32				$R_3 12$
10.722	2bd	096.74				
10.934	3	096.19			$R_2 14$	
11.080	1	095.81				
11.214	3	095.46				$S_{32}6$
11.392	2	095.00		$R_1 16$		
11.548	1	094.60				
11.668	1	094.29				$S_{31}6$
11.796	1	093.96				
11.887	5	093.72			$T_{31}3$	$R_{32}11$

λ	I	ν	Classification 11-8		
6212.173	1bd	16 092.98			
12.415	5	092.35			R_3 11
12.539	1	092.03			
12.686	2	091.65			
12.958	1	090.95			
13.096	1	090.59			
13.200	4	090.32		S_{21} 8	
13.330	3	089.98		R_2 13	
13.430	6	089.72			S_{32} 5
13.526	1	089.47			
13.604	1	089.27			
13.670	3	089.10			R_{32}10
13.773	2	088.84		R_{21}13	
13.853	3	088.63			S_{31} 5
13.983	1	088.29			
14.095	2	088.00			R_{31}10
14.203	3	087.72			R_3 10
14.272	2	087.54	R_1 15		
14.365	1	087.30			
14.472	1	087.02			
14.636	1	086.60			
14.763	2	086.27			T_{31}2
14.901	2	085.91			
14.990	1	085.68			
15.180	1	085.19			
15.327	5	084.81			R_{32}9
15.408	2	084.60			
15.491	5	084.39			S_{32} 4
15.566	1	084.19			
15.647	3	083.98		R_2 12	
15.769	2	083.67			R_{31}9
15.871	5	083.40			R_3 9
15.982	1	083.12			
16.112	5	082.78		S_{21} 7	R_{21}12]
16.282	2	082.34			
16.477	1	081.84			
16.659	1	081.37			
16.845	3	080.88			R_{32}8
16.924	1	080.68			
17.059	3	080.33	R_1 14		
17.179	1	080.02			
17.283	2	079.75			R_{31}8
17.389	9	079.48		[S_{32} 3	R_3 8
17.462	5	079.29			T_{31}1
17.591	1	078.96			
17.807	5	078.40		R_2 11	S_{31} 3
17.922	1	078.10			
18.081	1	077.69			
18.213	8	077.35			R_{32}7
18.283	4	077.17		R_{21}11	
18.443	1	076.75			
18.578	2	076.40			
18.661	1	076.19			R_{31}7
18.765	7	075.92			R_3 7
18.932	4	075.49		S_{21} 6	

λ	I	ν	Classification 11-8		
6219.013	2	16 075.28			
19.115	5	075.01			S_{32} 2
19.224	2	074.73			
19.341	1	074.43			
19.432	5	074.20			R_{32}6
19.504	4	074.01			S_{31} 2
19.684	1	073.54			
19.794	4	073.26	R_1 13		
19.860	1	073.09			R_{31}6
19.924	5	072.92		R_2 10	T_{31}0
19.997	5	072.74			R_3 6
20.125	1	072.40			
20.245	2	072.09			
20.378	3	071.75		R_{21}10	
20.498	8	071.44			R_{32}5
20.585	1	071.22			
20.672	8	070.99			S_{32} 1
20.809	2	070.64			
20.925	1	070.34			R_{31}5
21.011	5	070.12			S_{31} 1
21.076	6	069.95			R_3 5
21.164	1	069.72			
21.249	2	069.50			Q_3 15
21.290	4	069.39			
21.396	5	069.12			R_{32}4
21.651	6	068.46		S_{21} 5	
21.807	1	068.06			R_{31}4
21.929	4	067.75		R_2 9	Q_{32}14
21.997	4	067.57			R_3 4
22.057	1	067.41			
22.127	6	067.23			R_{32}3
22.260	1	066.89			
22.377	6	066.59		R_{21}9	
22.462	4	066.37	R_1 12		Q_3 14
22.535	3	066.18			R_{31}3
22.616	1	065.97			
22.684	4	065.79			R_{32}2
22.762	6	065.59			R_3 3
22.976	3	065.04			Q_{32}13
23.203	1d	064.46			
23.338	1	064.11			
23.402	2	063.94			P_3 2
23.516	5	063.65			Q_3 13
23.610	1	063.40			
23.838	3	062.82		R_2 8	
23.915	2	062.62			Q_{32}12
24.068	1	062.22			
24.181	2	061.93			
24.280	7	061.67		R_{21}8	S_{31} 4]
24.368	1	061.45			
24.446	4	061.25			Q_3 12
24.603	1	060.84			
24.706	2	060.58			Q_{32}11
24.793	1	060.35			
24.885	3	060.11			

λ	I	ν	Classification 11-8			λ	I	ν	Classification 11-8		
6225.045	6	16 059.70	R_1 11			6231.242	3	16 043.73		Q_{22}11	
25.148	2	059.44				31.329	3	043.51		Q_{23}11	
25.241	8	059.20			Q_3 11	31.445	1	043.21			
25.354	2	058.90			Q_{32}10	31.557	7	042.92		S_{22}1	
25.411	2	058.76				31.661	1	042.65			
25.527	1	058.46				31.740	2	042.45			P_3 5
25.642	5	058.16		R_2 7		31.812	5	042.26		Q_2 10	
25.693	5	058.03			Q_{32}3	31.908	3	042.01		R_2 3	
25.814	1	057.72				32.027	1	041.71			
25.892	6	057.52		[Q_3 10	Q_{32}9	32.128	2	041.45			
25.985	2	057.28				32.230	2	041.19		Q_{22}10	
26.082	8	057.03		R_{21}7		32.319	10	040.96		R_{22}3	
26.159	1	056.83			Q_{32}4	32.431	6	040.67	R_1 8		
26.240	3	056.62			Q_{32}8	32.559	1	040.34			
26.329	3	056.39			Q_3 3	32.671	6	040.05	Q_1 15		
26.420	9	056.15	[Q_{32}5	[Q_3 9	Q_{32}7	32.736	8	039.89		Q_2 9	
26.523	2	055.89			Q_{32}6	33.013	2	039.17			P_3 6
26.637	1	055.60				33.079	1	039.00			
26.736	3	055.34			Q_3 4	33.184	4	038.73		Q_{22}9	
26.803	9	055.17		S_{21} 3	Q_3 8	33.281	5	038.48		Q_{23}9	R_3 2]
26.889	1	054.95				33.405	2	038.16			
27.005	10	054.65		[Q_3 7	Q_3 5	33.494	2	037.93			
27.093	6	054.42		Q_2 14	Q_3 6	33.561	5	037.76		Q_2 8	
27.222	1	054.09				33.636	5	037.57		R_{22}2	
27.345	4	053.77		R_2 6		33.745	3	037.29		S_{22} 0	
.7.454	2	053.50				33.869	1	036.97			
27.569	4	053.19	R_1 10			34.007	3	036.61		Q_{22}8	
27.636	2	053.02				34.114	8	036.34		Q_{23}8	P_3 7
27.714	1	052.82				34.207	1	036.10			
27.786	6	052.63		R_{21}6		34.293	8	035.88		Q_2 7	
28.046	1	051.96				34.353	1	035.72			
28.186	1	051.60				34.433	4	035.52	Q_1 14		
28.308	1	051.29				34.517	1	035.30		R_2 1	
28.435	5	050.96		Q_2 13		34.606	2	035.07			
28.799	1	050.02				34.729	5	034.76		Q_{22}7	
28.888	2	049.79		Q_{21}13		34.778	9	034.63	R_1 7		
28.958	6	049.61		R_2 5	Q_{7}13]	34.850	9	034.45		R_{22}1	Q_{23}7]
29.076	1	049.31				34.926	4	034.25		Q_2 6	
29.237	5	048.89		S_{21}2		35.052	3	033.93			P_3 8
29.312	1	048,70				35.257	1	033.40			
29.395	9	048.49		R_{21}5		35.364	4	033.12		Q_{22}6	
29.534	1	048.13				35.467	7	032.86		Q_2 5	Q_{23}6]
29.662	4	047.80		Q_2 12		35.575	1	032.58			
29.858	1d	047.29				35.674	2	032.33	Q_{12}13		
30.031	8	046.85	R_1 9			35.757	1	032.11			
30.119	1	046.62		Q_{21}12		35.837	7	031.91			P_3 9
30.209	1	046.39		Q_{23}12		35.894	7	031.76		Q_{22}5	Q_3 4]
30.343	1	046.05			P_3 4	35.960	1	031.59		R_{21}0	
30.482	2	045.69		R_2 4		36.034	8	031.40		Q_{23}5	
30.616	1	045.34				36.123	7	031.17	Q_1 13		
30.707	1	045.11				36.238	2	030.88		Q_2 3	
30.785	7	044.91		Q_2 11		36.320	3	030.66		Q_{22}4	
30.900	7	044.61		R_{21}4		36.484	6	030.24	[Q_2 2	Q_{23}4	P_3 10
31.043	1	044.24				36.573	2	030.02			
31.152	1	043.96				36.655	4	029.80		Q_{22}3	Q_3 1]

λ	I	ν	Classification 11-8		
6236.776	1	16 029.49			
36.882	8	029.23		Q_{23}3	Q_{21}2]
36.948	5	029.05			P_3 11
37.013	2	028.88		Q_{23}1	
37.074	6	028.73	R_1 6		
37.136	1	028.57			
37.216	5	028.36		Q_{23}2	
37.289	4	028.17	Q_{12}12		P_3 12
37.389	2	027.92			
37.487	5	027.67			P_3 13
37.561	3	027.48			P_3 14
37.657	8	027.23		Q_{23}1	
37.739	5	027.02	Q_1 12		
37.844	2	026.75			
37.925	1	026.53			
38.010	2	026.32			
38.375	1	025.38			
38.483	1	025.11			
38.704	1	024.54		P_2 2	
38.836	3	024.20	Q_{12}11		
38.923	1	023.98			
39.0[illegible]	1	023.70			
39.16[illegible]	1	023.51			
39.168	2	023.35			
39.288	10	023.04	Q_1 11		
39.323	10	022.96	R_1 5		
39.413	6	022.72		P_{23}2	
39.523	0	022.44		P_2 3	
39.851	1	021.60			
40.180	10	020.75		P_{23}3	
40.320	3	020.39	Q_{12}10	P_2 4	
40.485	1	019.97			
40.593	1	019.69			
40.684	1	019.46			
40.777	8	019.22	Q_1 10		
40.844	1	019.05			
40.901	8	018.90		P_{23}4	
40.986	1	018.68		P_2 5	
41.068	1	018.47			
41.290	1d	017.90			
41.402	1d	017.61			
41.521	1	017.31			
41.554	10b	017.23	R_1 4	P_{23}5	P_2 6]
41.657	1	016.96			
41.755	5	016.71	Q_{12}9		
41.919	1	016.28			
42.050	5	015.95		P_2 7	
42.128	7	015.75		P_{23}6	
42.206	10	015.56	Q_1 9		
42.288	1	015.34		P_2 15	
42.354	5	015.17		O_{23}3	
42.442	5	014.95		P_2 8	
42.524	1	014.73			
42.616	10	014.50		P_{23}7	
42.749	5	014.16		P_2 9	
42.865	2	013.86			

λ	I	ν	Classification 11-8		
6242.944		16 013.66		P_2 10	P_2 13]
43.004		013.50		P_{23}8	
43.057	[illegible]	013.37		P_2 11	P_2 12]
43.134	[illegible]	013.17	Q_{12}8		
43.214		012.96			
43.297	[illegible]	012.75		P_{23}9	
43.39[illegible]		012.49			
43.486	7	012.26		P_{23}10	P_{23}13]
43.584	10b	012.02	Q_1 8	P_{23}11	P_{23}12]
43.693	[illegible]	011.74	R_1 3		
43.7[illegible]	1	011.49			
43.87[illegible]	2	011.26			
44.0[illegible]	1	010.71			
44.[illegible]7	4	010.52		O_{23}4	
44.[illegible]	1	010.26			
44.3[illegible]	2	010.01			
44.452	8	009.79	Q_{12}7		
44.528	1	009.59			
44.597	2	009.32			
44.633	1	009.20			
44.779	1	008.95			
44.899	10b	008.65	Q_1 7		
45.251	1	007.74			
45.516	2	007.06			
45.632	1	006.77			
45.728	6	006.52	Q_{12}6		
45.819	6	006.28	R_1 2		
45.907	8	006.05		O_{23}5	
46.012	1	005.79			
46.085	1	005.60			
46.165	10	005.40	Q_1 6		
46.264	1	005.15			
46.347	1	004.93			
46.515	1	004.50			
46.669	1	004.11			
46.871	1	003.59			
46.959	8	003.37	Q_{12}5		
47.230	1	002.67			
47.302	1	002.48			
47.391	10b	002.26	Q_1 5		
47.485	1	002.02			
47.562	6	001.82		O_{23}6	
47.756	2d	001.32	P_{12}16		
47.895	7	000.97	R_1 1		
47.999	1	000.70			
48.086	1	000.48			
48.145	5	000.33	Q_{12}4		
48.215	2	000.15	P_1 16		
48.358	2	15 999.78			
48.498	2	999.43	P_{12}15		
48.571	10	999.24	Q_1 4		
48.814	1	998.61			
48.955	4	998.25	P_1 15		
49.044	1	998.03			
49.137	9	997.79		O_{23}7	

λ	I	ν	Classification 11-8		
6249.223	1	15 997.56			
49.304	8	997.36	$Q_{12}3$		
49.457	1	996.97			
49.538	1	996.76			
49.623	2	996.54	P_1 14		
49.716	10b	996.31	Q_1 3	$P_{12}13]$	
49.824	1	996.03			
49.908	3	995.81	R_1 0		
50.031	1	995.51			
50.116	1	995.29			
50.215	5	995.04	P_1 13		
50.287	3	994.85	$P_{12}12$		
50.367	2	994.65			
50.427	4	994.49	$Q_{12}2$		
50.525	1	994.24			
50.617	5	994.01		$O_{23}8$	
50.678	1	993.85			
50.742	9	993.69	$P_{12}11$	P_1 12]	
50.815	8	993.50	Q_1 2		
51.019	1	992.98			
51.145	6	992.66	$P_{13}10$		
51.207	8	992.50	P_1 11		
51.274	1	992.33	$P_{13}11$		
51.336	2	992.17			
51.431	1	991.93			
51.501	10	991.75	$P_{12}9$	$Q_{13}1]$	
51.605	6	991.48	P_1 10		
51.698	2	991.24	$P_{13}10$		
51.766	8	991.02	$P_{12}8$		
51.870	10	990.80	Q_1 1		
51.948	8	990.60	P_1 9		
51.991	3	990.49			
52.029	10b	990.39	$P_{12}7$	$O_{23}9$	
52.132	1	990.13			
52.232	10	989.87	$P_{12}6$	P_1 8]	
52.312	2	989.67	$P_{13}8$		
52.393	10	989.46	$P_{12}5$		
52.478	9	989.24	P_1 7		
52.519	9	989.14	$P_{12}4$		
52.608	10	988.91	$P_{12}3$	$P_{13}7]$	
52.672	9	988.75	P_1 6	$P_{13}2$	
52.717	9	988.63	$P_{12}1$		
52.769	2	988.50			
52.825	10	988.36	P_1 5		
52.885	2	988.20			
52.936	6	988.07	P_1 4		
53.013	10	987.88	P_1 3	P_1 0]	
53.065	9	987.74	P_1 2	P_1 1]	
53.225	1	987.34	$P_{13}3$		
53.274	4	987.21		$O_{23}10$	
53.380	1	986.94	$P_{13}2$		
53.712	1	986.09			
54.469	6	984.16		$O_{23}11$	
54.553	1	983.94			
54.636	7	983.73	$O_{12}1$		

λ	I	ν	Classification 11-8		
6254.833	1	15 983.23			
55.031	1	982.72			
55.182	2	982.34			
55.308	2	982.01			
55.441	1	981.68			
55.551	5	981.39		$O_{23}12$	
55.625	6	981.20	$O_{12}2$	$O_{13}1]$	
55.775	00d	980.82			
55.904	1	980.49			
56.376	3	979.29	$O_{13}2$		
56.519	2	978.92	$N_{13}2$	$O_{23}13$	
56.584	10	978.75	$O_{12}3$		
56.704	1	978.45			
56.811	1	978.17			
57.116	1	977.39			
57.221	4	977.13	$O_{13}3$		
57.359	2	976.78		$O_{23}14$	
57.425	2	976.60			
57.517	8	976.37	$O_{12}4$		
57.661	1	976.00			
57.816	1	975.61			
57.916	1	975.35			
58.007	1	975.12			
58.119	3	974.83	$O_{13}4$		
58.213	3	974.59			
58.309	2	974.35			
58.423	10	974.06	$O_{12}5$	$N_{13}3]$	
58.527	1	973.79			
58.635	1	973.52			
58.909	1	972.82			
59.006	5	972.57	$O_{13}5$		
59.097	1	972.34			
59.205	1	972.06			
59.297	7	971.83	$O_{12}6$		
59.440	2	971.46			
59.587	1	971.09			
59.716	2	970.76			
59.811	2	970.52			
59.863	3	970.39	$O_{13}6$		
59.947	1	970.17			
60.022	2	969.98			
60.128	10	969.71	$O_{12}7$		
60.214	1	969.49			
60.300	1	969.27			
60.373	3	969.08	$N_{12}4$		
60.490	1	968.78			
60.580	2	968.55			
60.688	4	968.28	$O_{13}7$		
60.812	1	967.96			
60.918	7	967.69	$O_{12}8$		
61.034	1	967.40			
61.301	1	966.72			
61.397	1	966.47			
61.487	3	966.24	$O_{13}8$		
61.573	1	966.02			

λ	I	ν	Classification 11-8		10-7	
6261.667	10	15 965.78	$O_{12}9$			
61.761	1	965.54				
61.827	1	965.37				
61.883	3	965.23				
62.052	1	964.80				
62.160	2	964.53				
62.220	4	964.37	$O_{13}9$			
62.320	5	964.12	$N_{13}5$			
62.365	5	964.06	$O_{12}10$			
62.459	1	963.76				
62.578	2	963.46				
62.905	2	962.63	$O_{13}10$			
63.009	7	962.36	$O_{12}11$			$S_{32}12$
63.212	1	961.84				$T_{31}8$
63.412	2	961.34				
63.545	2	961.00	$O_{13}11$			
63.598	4	960.86	$O_{12}12$			
63.691	1	960.62				
63.838	2	960.25				
63.943	1	959.99				
64.118	6	959.53	$O_{12}13$	$O_{13}12$]		
64.242	4	959.22	$N_{13}6$			
64.328	1	959.00				
64.583	3	958.35	$O_{12}14$			
64.659	2	958.16	$O_{13}13$			
64.747	1	957.94				
64.851	1	957.67				
64.968	3	957.37	$O_{12}15$			
65.072	2	957.11				
65.229	2	956.71	$O_{12}16$			
65.392	1	956.29	$O_{12}17$			
65.532	2	955.94	$O_{13}15$			
65.636	1	955.67				
65.764	3	955.35				
66.042	1	954.64				
66.143	7	954.38	$N_{13}7$			$S_{32}11$
66.256	1	954.09				
66.554	3	953.34				
66.688	3	952.99				
66.819	1	952.66				
66.910	1	952.42				
66.983	2	952.25				$T_{31}7$
67.079	2	952.00				
67.342	2	951.30				$R_3 17$
67.646	1	950.55				
67.893	2	949.92				
67.996	5	949.67	$N_{13}8$			
68.113	1	949.35				
68.360	2	948.74				
68.493	1	948.40				
68.608	1	948.11				
68.716	2	947.83			$S_{21}12$	
68.969	2	947.19				
69.098	1	946.86				
69.201	2	946.60				$S_{32}10$

λ	I	ν	Classification 11-8	10-7	
6269.323	1	15 946.28			
69.431	2	946.01			
69.580	1	945.64			
69.748	2	945.21			
69.841	3	944.97	$N_{13}9$		
69.935	1	944.73			$R_3 16$
70.013	2	944.54			
70.119	2	944.26			
70.269	1	943.88			
70.422	1	943.50			
70.572	3	943.11			$T_{31}6$
70.723	1	942.72			
70.821	1	942.48			
70.978	3	942.08			
71.083	1	941.82			
71.323	2	941.20			
71.404	1	941.00			
71.478	2	940.81			
71.582	2	940.55			
71.729	2	940.17			
71.896	3	939.74			$P_{32}15$
71.973	1	939.55			
72.066	5	939.32			$S_{32}9$
72.147	5	939.11		$S_{21}11$	
72.263	2	938.82			
72.340	1	938.62			
72.423	3	938.41			$R_3 15$
72.543	2	938.10			$S_{31}9$
72.770	2	937.53			
72.902	1	937.19			
72.969	3	937.02			
73.536	1	935.58			
74.038	2	934.30			$T_{31}5$
74.144	1	934.03			
74.257	2	933.75			$R_{32}14$
74.789	2d	932.40		[$R_3 14$	$S_{32}8$
75.446	0	930.73		$S_{21}10$	
75.612	2	930.30			
75.849	1	929.70			
76.042	2	929.21			
76.274	1bd	928.63			
76.489	1b	928.08			$R_{32}13$
76.616	3	927.76			
76.763	1	927.38			
76.871	3	927.11			
77.024	2	926.72			$R_3 13$
77.137	0bd	926.44			
77.382	6	925.62		[$T_{31}4$	$S_{32}7$
77.834	1	924.67			$S_{31}7$
78.230	2	923.66			
78.480	2	923.03			
78.569	1	922.80			$R_{32}12$
78.652	2	922.59		$S_{21}9$	
79.122	1	921.40			$R_3 12$
79.267	1	921.03			

λ	I	ν	Classification 10-7			λ	I	ν	Classification 10-7		
6279.507	1	15 920.42				6287.057	3	15 901.31		R_{21}11	
79.832	4	919.60			S_{32} 6	87.092	7	901.27			R_{32}7
79.980	1	919.23				87.218	3	900.90			
80.109	3	918.90				87.460	1	900.29			
80.280	1	918.47			S_{31} 6	87.563	3	900.03			R_{31}7
80.387	1	918.20				87.665	8	15 899.77		S_{21} 6	R_3 7
80.524	5	917.85		[R_{32}11	T_{31}3	87.932	1	899.09			
80.640	1	917.55				88.018	6	898.88			S_{32} 2
80.737	2	917.31				88.200	1d	898.41			
80.934	1bd	916.81				88.351	5	898.03			R_{32}6
81.104	4	916.38			R_3 11	88.417	3	897.87			S_{31} 2
81.260	1	915.98				88.529	3	897.58	R_1 13		
81.405	1	915.61				88.658	1	897.26			
81.502	1	915.37				88.761	2	897.00		R_2 10	
81.662	2	914.96				88.861	5	896.74			T_{31}0
81.760	2	914.72		S_{21} 8		88.938	5	896.55			R_3 6
81.865	1	914.45				89.035	1	896.30			
81.959	1	914.21		R_2 13		89.140	1	896.04			
82.125	8	913.79			S_{32} 5	89.215	3	895.85		R_{21}10	
82.327	1	913.28				89.331	2	895.56			
82.413	2	913.06		R_{21}13	R_{32}10	89.400	2	895.38			
82.561	3	912.69			S_{31} 5	89.456	9	895.24			R_{32}5
82.737	0	912.24	R_1 15			89.547	1	895.01			
82.856	1	911.94			R_{31}10	89.631	9	894.80			S_{32} 1
82.955	2	911.69			R_3 10	89.800	1	894.37			Q_{32}15
83.105	1	911.31				89.902	1	894.11			R_{31}5
83.360	3	910.66				89.981	4	893.91			S_{31} 1
83.427	1	910.49				90.048	8	893.74			R_3 5
83.504	3	910.30			T_{31}2	90.196	1bd	893.37			
83.655	1	909.91				90.341	2	893.00			Q_3 15
83.763	1	909.[illegible]4				90.[illegible]3	6	892.90			R_{32}4
83.886	1d	909.33				90.489	6	892.63		S_{21} 5	
83.991	1	909.07				90.820	4	891.79		R_2 9	R_{31}4
84.112	5	908.76			R_{32}9	90.874	1	891.66			
84.189	1	908.56				90.946	1	891.48			
84.259	5	908.39			S_{32} 4	90.998	4	891.35			R_3 4
84.327	2	908.21		R_2 12		91.055	2	891.20			
84.392	1	908.05				91.139	8	890.99			R_{32}3
84.519	1d	907.73			R_{31}9	91.210	1	890.81			
84.670	6	907.35		[R_3 9	S_{31} 4	91.274	6	890.65	R_1 12	R_{21}9	
84.769	5	907.10		S_{31} 7	R_{21}12]	91.386	1	890.37			
84.917	1	906.72				91.489	1	890.11			Q_3 14
85.102	1	906.25				91.561	4	889.92			R_{31}3
85.213	2	905.97				91.635	1	889.73			
85.397	1	905.51				91.723	5	889.51			R_{32}2
85.678	4	904.80			R_{32}8	91.793	6	889.34			R_3 3
85.881	1	904.28				92.039	1	888.71			Q_{32}13
86.119	0	903.58			R_{31}8	92.354	1	887.92			
86.225	9	903.41		[S_{32} 3	R_3 8	92.452	2	887.67			R_3 2
86.291	6	903.24			T_{31}1	92.588	4	887.33			Q_3 13
86.472	2	902.79				92.692	1	887.07			
86.586	2	902.50		R_2 11		92.786	3	886.83		R_2 8	
86.645	5	902.35			S_{31} 3	92.990	1	886.32			
86.791	1	901.[illegible]				93.102	1	886.03			
86.955	1	901.56				93.221	7	885.73		S_{21} 4	R_{21}8]

λ	I	ν	Classification 10-7		
6293.345	1	15 885.42			
93.431	1	885.20			
93.515	1	884.99			
93.585	4	884.81			Q_3 12
93.705	1	884.51			
93.859	1	884.13			Q_{32}11
93.928	6	883.95	R_1 11		
94.034	1	883.68			
94.275	2	883.07			
94.399	7	882.76			Q_3 11
94.503	1	882.49			Q_{32}10
94.584	1	882.29			
94.645	5	882.14		R_2 7	
94.716	1	881.96			
94.796	3	881.76		Q_1 15	
94.846	4	881.63			Q_{32}3
94.936	1	881.40			
95.052	3	881.11		[Q_3 10	Q_{32}9
95.091	9	881.01		R_{21}7	
95.213	1	860.70			
95.324	2d	880.42		Q_{21}15	Q_{32}4
95.429	2	880.16			Q_{32}8
95.497	4	879.99			Q_3 3
95.605	9	879.71		[Q_3 9	Q_{32}5
95.647	4	879.61			Q_{32}7
95.717	1	879.43			Q_{32}6
95.819	8	879.17		S_{21} 3	
95.923	5	878.91			Q_3 4
95.989	6	878.75			Q_3 8
96.061	1	878.57			
96.191	10	878.24			Q_3 5
96.222	10	878.16			Q_3 7
96.284	7	878.00		Q_2 14	Q_3 6
96.401	2	877.71		R_2 6	
96.519	3	877.41	R_1 10		
96.760	1	876.80		Q_{21}14	
96.353	5	876.57		R_{21}6	Q_{23}14]
96.904	1	876.44			
96.975	4	876.26			
97.058	1	876.05			
97.169	2	875.77			
97 400	1d	875.19			
97.621	4	874.63		Q_2 13	
97.771	1	874.25			
97.868	1	874.01			
98.072	6	873.50		R_2 5	Q_{21}13]
98.163	1	873.27		Q_{23}13	
98.330	5	872.84		S_{21}2	
98.412	1	872.64			
98.509	10	872.39		R_{21}5	
98.609	1	872.14			
98.721	1	871.86			
98.824	2	871.60			
98.872	3	871.48		Q_2 12	
98.928	2	871.34			

λ	I	ν	Classification 10-7		
6298.990	1	15 871.18			
99.057	7	871.01	R_1 9		
99.205	1	870.64			
99.269	1	[illegible]			
99.331	2	870.32		Q_{21}12	
99.429	2	870.08		Q_{23}12	
99.531	1	869.82			
99.635	3	869.56		R_2 4	P_3 4
99.797	1	869.15			
99.877	1	868.95			
99.946	1	868.77			
6300.023	7	868.58		Q_2 11	
00.070	7	868.46		R_{21}4	
00.133	1	868.30			
00.404	1	867.62			
00.485	2	867.42		Q_{21}11	
00.581	2	867.17		Q_{23}11	
00.657	1	866.98			
00.734	7	866.79		S_{21}1	
00.907	3	866.35			
00.991	1	866.14			
01.066	4	865.95		Q_2 10	
01.119	5	865.82		R_2 3	P_3 5
01.337	1	865.27			
01.429	1	865.04			
01.530	10	864.78	R_1 8	R_{21}3	Q_{23}10]
01.626	1	864.54		Q_{23}10	
01.759	2	864.21			
01.892	3	863.87	Q_1 15		
02.017	7	863.56		Q_2 9	
02.296	1	862.86			
02.432	2	862.51			P_3 6
02.483	5	862.39		R_2 2	Q_{21}9]
02.584	4	862.13		Q_{23}9	
02.700	1	861.84			
02.783	1	861.63			
02.881	7	861.38		R_{21}2	Q_2 8]
02.992	3	861.11		S_{21} 0	
03.071	1	860.91			
03.149	1	860.71			
03.210	3	860.56	Q_{12}14		
03.328	3	860.26		Q_{21}8	
03.430	3	860.00		Q_{23}8	
03.502	1	859.82			
03.599	8	859.58		Q_2 7	P_3 7
03.721	3	859.27	Q_1 14		
03.790	1	859.10		R_2 1	
03.886	1	858.86			
03.958	8	858.67	R_1 7		
04.014	1	858.53			
04.063	5	858.41		Q_{21}7	
04.147	8	858.20		R_{21}1	
04.182	8	858.11		Q_{23}7	
04.253	4	857.93		Q_2 6	
04.556	4	857.17			P_3 8

λ	I	ν	Classification 10-7		
6304.635	2	15 856.97	-		
04.700	3	856.81		$Q_{21}6$	
04.809	7	856.53		$Q_{23}6$	Q_2 5]
04.956	2	856.16	$Q_{12}13$		
05.243	8	855.44	[$R_{21}0$	$Q_{21}5$	Q_2 4
05.307	1	855.28			
05.383	9	855.09		$Q_{23}5$	P_3 9
05.441	7	854.94	Q_1 13		
05.511	1	854.77			
05.588	4	854.58		Q_2 3	
05.673	3	854.36		$Q_{21}4$	
05.729	3	854.22			
05.791	1	854.06			
05.862	5	853.89		$Q_{23}4$	Q_3 2
05.939	1	853.69			
06.026	6	853.47	[Q_2 1	$Q_{21}3$	P_3 10
06.146	1	853.17			
06.257	9	852.89		$Q_{23}3$	$Q_{11}2$]
06.320	6	852.73	R_1 6		
06.405	2	852.52		$Q_{21}1$	
06.464	1	852.37			
06.533	5	852.20			P_3 11
06.610	6	852.00	$Q_{12}12$	$Q_{23}2$	
06.696	1	851.79			
06.900	2	851.28			P_3 12
06.978	1	851.08			
07.055	9	850.89		$Q_{23}1$	
07.105	6	850.76	Q_1 12		P_3 13
07.181	1	850.57		[P_3 15	P_3 14
07.339	1	850.17			
07.662	2	849.36			
07.747	2	849.13			
07.951	1	848.64			
08.089	3	848.29		P_2 2	
08.218	3	847.96	$Q_{12}11$		
08.323	1	847.70			
08.480	2	847.31			
08.558	1	847.11			
08.642	10	846.90	R_1 5		
08.682	10	846.80	$Q_1 11$		
08.753	1	846.62			
08.820	1	846.45			
08.881	7	846.30		$P_{21}2$	
09.033	1d	845.92		P_2 3	
09.246	2d	845.38			
09.339	2d	845.15			
09.550	1bd	844.62			
09.635	2	844.40			
09.677	10	844.30		$P_{23}3$	
09.740	2	844.14	$Q_{12}10$		
09.826	1	843.93		P_2 4	
09.929	2	843.67			
10.035	1	843.40			
10.136	2	843.15			
10.206	7	842.97	Q_1 10		

λ	I	ν	Classification 10-7		
6310.331	1	15 842.65			
10.434	8	842.40		$P_{23}6$	
10.519	3	842.19		P_2 5	
10.710	1	841.71			
10.813	1	841.45			
10.920	7	841.18	R_1 4		
10.979	1	841.03			
11.053	1	840.85			
11.120	10	840.68		$P_{23}5$	P_2 6]
11.206	5	840.46	$Q_{12}9$		
11.309	3	840.20			
11.397	1	839.98			
11.473	3	839.79			
11.563	3	839.57			
11.666	10	839.31	Q_1 9	P_2 7	
11.720	7	839.17		$P_{23}6$	
11.829	1	838.90			
11.932	5	838.64		$Q_{23}3$	
12.012	1	838.44			
12.085	3	838.26		P_2 8	
12.155	2	838.08		P_2 15	
12.231	10	837.89		$P_{23}7$	
12.313	1	837.68			
12.400	4	837.46		P_2 9	
12.470	1	837.29		P_2 14	
12.549	1	837.09			
12.618	6	836.92	$Q_{12}8$	P_2 10	
12.653	7	836.83		$P_{23}8$	P_2 13]
12.739	4	836.61		P_2 11	P_2 12]
12.832	1	836.38			
12.903	[illegible]	836.20			
12.967	8	836.04		$P_{23}9$	
13.021	1	835.91		$P_{23}14$	
13.076	8	835.77	Q_1 8		
13.152	8	835.58	R_1 3	$P_{23}10$	
13.205	6	835.44		$P_{23}13$	
13.292	7	835.23		$P_{23}11$	$P_{23}12$]
13.393	1	834.97			
13.474	2	834.77			
13.544	1	834.60			
13.628	1	834.38			
13.730	1	834.13			
13.816	4	833.91		$Q_{23}4$	
13.887	1	833.74			
13.968	6	833.53	$Q_{12}7$		
14.089	1	833.23			
14.236	1	832.86			
14.349	1	832.58			
14.427	10	832.38	Q_1 7		
14.648	1bd	831.83			
14.861	1d	831.29			
15.125	1bd	830.63			
15.278	5	830.25	$Q_{12}6$		
15.343	6	830.06	R_1 2		
15.438	1	829.85			

λ	I	ν	Classification 10-7		9-6	λ	I	ν	Classification 10-7		9-6
6315.524	1	15 829.63				6321.436	5	15 814.83	P_{1} 10		
15.627	8	829.37		$O_{23}5$		21.511	1	814.64	$P_{13}10$		
15.727	9	829.12	Q_{1} 6			21.600	10	814.42	$P_{12}8$	Q_{1} 1]	
15.911	1	828.66				21.675	1	814.23			
16.259	3	827.79				21.730	1	814.09			
16.395	1	827.45				21.774	9	813.98	P_{1} 9		
16.544	8	827.08	$Q_{12}5$			21.837	10	813.82	$P_{13}7$		
16.749	1	826.56				21.906	1	813.65	$P_{13}9$		
16.864	2	826.27				21.981	7	813.46		$O_{23}9$	
16.991	10	825.96	Q_{1} 5			22.024	8	813.36	$P_{13}6$		
17.139	1	825.58				22.056	8	813.28	P_{1} 8		
17.223	2	825.37	P_{1} 17			22.108	1	813.15			
17.354	5	825.05		$O_{23}6$		22.181	10	812.96	$P_{13}5$	$P_{13}8$]	
17.423	1	824.87				22.240	2	812.82			
17.496	6	824.69	R_{1} 1			22.295	10	812.68	$P_{13}4$	P_{1} 7]	
17.665	1	824.27				22.388	10	812.45	$P_{13}3$	$P_{13}7$]	
17.768	5	824.01	$Q_{12}4$			22.456	9	812.28	$P_{12}2$		
17.868	1	823.76				22.490	10	812.19	$P_{13}1$	P_{1} 6]	
17.951	2	823.55				22.546	1	812.05			
18.050	1	823.30	P_{1} 16			22.621	10	811.86	P_{1} 5	$P_{13}6$]	Q_{1} 0]
13.140	1	823.08				22.676	1	811.72			
18.206	9	822.91	Q_{1} 4			22.728	7	811.59	P_{1} 4		
18.318	2	822.63	$P_{12}15$			22.801	9	811.41	P_{1} 3	$P_{13}5$]	P_{1} 0]
10.571	1	822.00				22.849	9	811.29	P_{1} 1	P_{1} 2]	
18.669	1	821.75				23.034	1	810.83	$P_{13}3$		
18.793	3	821.44	P_{1} 15			23.114	1	810.63			
18.887	1	821.21				23.208	1	810.39	$P_{13}2$		
18.957	8	821.03	$Q_{12}3$			23.323	4	810.11		O[illegible]10	
18.990	8	820.95	$P_{12}15$	$Q_{23}7$		23.486	1	809.70	$P_{13}1$		
19.079	1	820.73				24.123	1	808.11			
19.181	2	820.47				24.469	8	807.24	$O_{12}1$		
19.291	1	820.19				24.572	5	806.98		$O_{23}11$	
19.377	10	819.98	Q_{1} 3			25.077	0	805.72			$T_{31}10$
19.458	2	819.78	P_{1} 14			25.498	7	804.67	$O_{12}2$	$O_{13}1$]	
19.578	[illegible]	819.40	$P_{12}13$	R_{1} 0]		25.608	1	804.40			
19.832	1d	818.84				25.715	2	804.13		$O_{23}12$	
19.949	1d	818.55				25.954	1	803.53			
20.056	4	818.28	P_{1} 13	$P_{12}12$]		26.241	2	802.81	$O_{13}2$		
20.116	5	818.13	$Q_{12}2$			26.348	1	802.55			
20.223	1	817.86				26.426	1	802.35	$N_{13}2$		
20.357	1d	817.53				26.498	10	802.17	$O_{13}3$		
20.446	1	817.30				26.637	1	801.83			
20.517	9	817.13	Q_{1} 2	$O_{23}8$		26.758	3	801.55		$O_{23}13$	
20.576	8	816.98	$P_{12}11$	P_{1} 12]		26.890	1	801.19			
20.661	1	816.77				27.029	2	800.85			
20.751	1	816.54			$T_{31}11$	27.076	1	800.68			
20.831	1	816.34				27.162	[illegible]	800.51	$O_{13}3$		
20.908	1	816.15				27.283	1	800.21			
20.973	5	815.98	$P_{12}10$			27.400	2	15 799.72			
21.040	7	815.82	P_{1} 11			27.475	8	799.[illegible]	$O_{12}4$		
21.117	1	815.62	$P_{13}11$			27.684	1	799.21		O[illegible]	
21.187	1	815.45				27.807	1	798.90			
21.241	4	815.31	$Q_{12}1$			28.096	3	[illegible].18	[illegible]		
21.309	9	815.14	$P_{12}9$			28.343	2	797.55			
21.362	1	814.96				28.422	10	797.37	$O_{13}5$	$N_{13}3$]	

λ	I	ν	Classification 10-7		9-6
6328.507	1	15 797.16		O_{23}15	
28.633	1	796.64			
28.847	1	796.31			
28.946	1	796.06			
29.022	5	795.87	O_{13}5		
29.106	1	795.46			T_{31}9
29.335	8	795.09	O_{13}6		
29.759	2	794.03			
29.834	3	793.84			
29.930	3	793.61	O_{13}6		
30.040	1	793.33			
30.131	1	793.10			
30.213	10	792.90	O_{13}7		
30.326	1	792.62			
30.443	2	792.32	N_{13}4		
30.564	1	792.02			
30.602	1	791.73			
30.790	4	791.46	O_{13}7		
31.046	6	790.82	O_{13}8		
31.118	1	790.64			
31.285	3	790.22			
31.401	1	789.94			
31.524	2	789.63			
31.620	2	789.39	O_{13}8		
31.703	2	789.18			
31.838	9	788.85	O_{13}9		
31.937	1	788.60			
32.212	4	787.91			
32.397	2	787.45	O_{13}9		
32.466	5	787.28	N_{13}5		
32.579	4	787.00	O_{12}10		
32.697	1	786.70			
32.795	1	786.46			
32.886	2	786.23			
33.129	2	785.63	O_{13}10		S_{32}12
33.212	1	785.42			T_{31}8
33.267	5	785.28	O_{12}11		
33.700	3	784.20			
33.817	1	783.91	O_{13}11		
33.889	3	783.73	O_{12}12		
33.971	3	783.53			
34.456	5	782.32	O_{12}13	N_{13}6]	
34.538	1	782.12			
34.673	2	781.78			
34.955	2bd	781.08	O_{12}14		
35.235	1	780.38			
35.383	2	780.01	O_{12}15		
35.570	1d	779.54			
35.728	1	779.15	O_{12}16		
35.793	3	778.99			
35.981	4	778.52			
36.059	2	778.33			
36.166	1	778.06			
36.249	1	777.85			
36.336	2	777.64			S_{32}11

λ	I	ν	Classification 10-7	9-6	
6336.444	4	15 777.37	N_{13}7		
36.609	1	776.96			
36.927	1	776.18			
37.094	3	775.75			T_{31}7
37.323	1bd	775.18			
37.557	2	774.60			
37.624	1	774.43			
38.235	1	772.91			
38.405	2	772.49	N_{13}8		
38.551	2	772.12			
38.702	1	771.75			
38.838	2	771.41			
39.020	2	770.96			
39.202	1	770.50			
39.271	5	770.33			
39.426	2	769.95			S_{32}10
39.565	1	769.60			
39.719	1	769.22			
39.844	2	768.91			
40.008	1	768.50			
40.299	4	767.77	N_{13}9		
40.466	1	767.36			
40.547	1	767.16			
40.758	1	766.63			
40.852	2	766.40			T_{31}6
40.982	1	766.09			
41.119	3	765.74			
41.583	1	764.58			
41.788	1	764.07			
42.039	1	763.45			
42.177	1	763.11	N_{13}10		
42.270	2	762.88			
42.348	1	762.68			
42.393	5	762.56			S_{32}9
42.513	1	762.27			
42.645	2	761.94			
42.846	3	761.44			S_{31}9
42.981	1	761.11			
43.126	5	760.75			
43.988	1d	758.61	N_{13}11		
44.245	1d	757.97			
44.437	5	757.49			T_{31}5
44.643	1	756.98			
44.737	1	756.75			
45.091	1	755.87			
45.222	4	755.54			S_{32}8
45.285	3	755.38			
45.410	1	755.08			
45.506	1	754.84			
45.575	2	754.66			
45.619	3	754.56			
45.690	1	754.38			S_{31}8
45.772	1	754.18			
45.872	3	753.93			
45.967	1d	753.69			

λ	I	ν	Classification 10-7	9-6	
6346.099	1d	15 753.36			
46.235	2	753.03			
46.332	2	752.79			
46.450	1	752.49			
46.520	1	752.07			
46 882	1	751.42			
47.000	4	751.13			R_{32}13
47.224	1	750.57			
47.386	2	750.17			
47.483	1	749.93			
47.562	4	749.73			R_3 13
47.627	4	749.57			
47.769	2	749.22			
47.864	3	748.98			T_{31}4
47.903	7	748.89			S_{32} 7
47.998	1	748.65			
48.136	1	748.31			
48.267	1	747.98			
48.366	3	747.74			S_{31} 7
48.463	1	747.50			
48.578	1	747.21			
48.693	2	746.93			
48.856	1	746.52			
49.016	1	746.13			
49.088	4	745.95		S_{21} 9	
49.174	2	745.73			R_{32}12
49.314	1	745.39			
49.423	1	745.12			
49.518	2	744.88			
49.642	1	744.57			
49.739	3	744.33			R_3 12
49.930	1	743.86			
50.041	3	743.58			
50.113	2	743.41			
50.210	2	743.17			
50.353	1	742.81			
50.440	6	742.60			S_{32} 6
50.597	1	742.21			
50.725	1	741.89			
50.829	1	741.61			
50.897	4	741.46			S_{31} 6
51.053	1	741.08			
51.146	7	740.85			T_{31}3
51.221	4	740.66			R_{32}12
51.337	1	740.37			
51.441	2	740.11			
51.557	2	739.83			
51.661	1	739.57			
51.784	6	739.25			R_3 11
51.934	3	738.89			
52.162	1	738.33			
52.307	3	737.97		S_{21} 8	
52.431	1	737.66			
52.516	1	737.45		R_2 13	
52.574	4	737.31			

λ	I	ν	Classification 9-6		
6352.719	1	15 736.95			
52.816	10	736.71			S_{32} 3
52.879	1	736.55			
52.976	1	736.31			
53.049	3	736.13			
53.129	5	735.93			R_{32}10
53.192	1	735.76			
53.262	6	735.60			S_{31} 5
53.406	2	735.25			
53.575	1	734.83			R_{21}10
53.695	4	734.53			R_3 10
53.901	1	734.02			
54.017	1	733.73			
54.242	6	733.18			T_{32}2
54.601	1	732.29			
54.761	1	731.69			
54.895	7	731.56			R_{32}9
54.965	1	731.39		R_2 12	
55.027	8	731.23			S_{32}4
55.154	2	730.92			
55.242	2	730.70			
55.338	2	730.46			R_{31}9
55.406	7	730.30		S_{21} 7	
55.467	8	730.14		R_{21}12	$R_3$9 S_{31}4
55.627	1	729.75			
55.879	1	729.12			
56.043	2	728.72			
56.285	1	728.12			
56.388	1	727.86			
56.511	6	727.56			R_{32}8
56.622	1	727.29			
56.878	1	726.65			
56.983	1	726.39			
57.069	10	726.18			S_{32} 3
57.134	9	726.02		[R_3 8	T_{31}1
57.203	1	725.85			
57.264	3	725.70			
57.347	4	725.49		R_2 11	
57.429	1	725.29			
57.497	7	725.12			S_{31} 3
57.708	1	724.60			
57.828	4	724.30		R_{21}11	
57.899	1	724.13			
57.975	10	723.94			R_{32}7
58.199	1	723.38			
58.282	3	723.18			
58.355	1	723.00			
58.425	6	722.83		S_{21} 6	R_{31}7
58.499	1	722.64			
58.561	10	722.49			R_3 7
58.691	1	722.17			
58.926	9	721.59			S_{32} 2
59.131	1d	721.11			
59.274	8	720.73	R_1 13		R_{32}6
59.334	5	720.58			S_{31} 2

λ	I	ν	Classification 9-6		
6359.442	1	15 720.31			
59.518	1	720.12			
59.588	3	719.95		R_2 10	
59.706	1	719.66			R_{31}6
59.795	8	719.44			T_{31}0
59.871	7	719.25			R_3 6
59.968	1	719.01			
60.063	5	718.78		R_{21}10	
60.334	1	718.11			
60.419	10	717.90			R_{32}5
60.510	1	717.67			
60.595	10	717.46			S_{32} 1
60.692	2	717.22			
60.792	1	716.97			
60.876	3	716.77			R_{31}5
60.962	7	716.55			S_{31} 1
61.029	9	716.39			R_3 5
61.159	1	716.07			
61.257	1	715.83			
61.324	9	715.66		S_{21} 5	
61.384	8	715.51			R_{32}4
61.423	2	715.42			Q_3 15
61.530	3	615.15			
61.620	1	614.93			
61.705	5	614.72		R_2 9	
61.823	2	614.43			R_{31}4
61.918	1	614.19			
62.014	7	613.96	R_1 12		R_3 4
62.085	3	613.78			
62.168	10	613.58		R_{21}9	R_{32}3
62.247	1	613.38			
62.336	1	613.16			
62.422	2	712.95			
62.510	1	712.73			
62.601	4	712.51			R_{31}3
62.661	3	712.36			Q_3 14
62.754	7	712.13			R_{32}2
62.834	9	711.93			R_3 3
63.016	1d	711.48			
63.190	2	711.05		[Q_{32}13	R_{31}2
63.350	1	710.66			
63.521	5	710.24			R_3 2
63.612	3	710.01			
63.671	2	709.86			
63.723	3	709.74		R_2 8	
63.758	6	709.65			Q_3 13
63.871	1	709.37			
63.934	2	709.09			
64.064	1	708.89			
64.131	6	708.73		S_{21} 4	Q_{32}12
64.198	5	708.56		R_{21}8	
64.311	1	708.29			
64.653	1	707.44			
64.735	5	707.24			Q_3 12
64.812	6	707.05	R_1 11		

λ	I	ν	Classification 9-6		
6364.985	4	15 706.62			Q_{32}11
65.085	2	706.37			
65.386	1	705.63			
65.571	9	705.17			Q_3 11
65.648	7	704.99		R_2 7	Q_{32}10
65.787	2	704.64		Q_2 15	
65.855	1	704.47			
65.916	4	704.33			
65.999	6	704.12			Q_{32}5
66.117	10	703.83		R_{21}7	
66.178	1	703.68			
66.219	2	703.58			Q_{32}9
66.258	7	703.48			Q_3 10
66.393	1	703.15			
66.489	4	702.91			Q_{32}4
66.562	1	702.73			
66.620	3	702.59			Q_{32}8
66.680	7	702.44			Q_3 3
66.790	10	702.17		[Q_3 9	Q_{32}5
66.838	10	702.05		S_{21} 3	Q_{32}7
66.899	4	701.90			Q_{32}6
66.986	1	701.68			
67.058	3	701.51			
67.124	7	701.35			Q_3 4
67.198	8	701.16			Q_3 8
67.276	1	700.97			
67.336	1	700.82			
67.394	10	700.68		Q_2 14	Q_3 5
67.435	10	700.58		R_2 6	Q_3 7
67.492	9	700.44	R_1 10		Q_3 6
67.643	1	700.06			
67.737	1	15 699.03			
67.861	3	699.53			
67.923	9	699.38		R_{21}6	
68.102	1	698.94			
68.434	1	698.12			
68.641	1	697.60	Q_{12}17		
68.799	5	697.21		Q_2 13	
68.951	1	696.84			
69.096	1	696.48			
69.179	6	696.28	Q_1 17	R_2 5	
69.239	3	696.13			
69.361	-1	695.83		Q_{21}13	
69.433	7	695.65		S_{21} 2	
69.538	1	695.39			
69.632	10	695.16		R_{21}5	
69.883	3	694.54			
70.003	1	694.25			
70.091	10	694.03	R_1 9	Q_2 12	
70.187	1	693.79			
70.262	2	693.61			
70.427	1	693.20			
70.565	1	692.86		Q_{21}12	
70.652	2	692.65		Q_{21}12	
70.735	1	692.45	Q_{12}16		

λ	I	ν	Classification 9-6		
6370.794	4	15 692.30		R_2 4	
70.945	2	691.93			P_3 4
71.054	1	691.66			
71.168	2	691.38	Q_1 16		
71.247	10	691.18		R_{21}4	Q_2 11]
71.340	1	690.96			
71.428	1	690.74			
71.525	2	690.50			
71.628	1	690.25			
71.742	3	689.97		Q_{21}11	
71.840	4	689.72		Q_{23}11	
71.918	10	689.53		S_{21} 1	
72.145	1	688.97			
72.264	1	688.68			
72.333	7	688.51		R_2 3	Q_2 10]
72.423	1	688.29			
72.510	6	688.08			P_3 5
72.585	1	687.89			
72.645	7	687.74	R_1 8	Q_{12}15]	
72.748	10	687.49		R_{21}3	
72.810	2	687.34		Q_{21}10	
72.909	3	687.09		Q_{23}10	
72.993	3	686.88			
73.067	1	686.70			
73.150	5	686.50	Q_1 15		
73.236	1	686.29			
73.310	9	686.11		Q_2 9	
73.617	1d	685.35			
73.731	2	685.07		2	
73.787	6	684.93		Q_{21}9	
73.884	8	684.69		Q_{23}9	P_3 6
73.990	1	684.43			
74.083	1	684.20			
74.162	10	684.01		R_{21}2	Q_2 8]
74.267	4	683.75		S_{21} 0	
74.334	1	683.59			
74.409	3	683.40			
74.531	1	683.10	Q_{12}14		
74.643	4	682.82		Q_{21}8	
74.686	3	682.72			
74.758	5	682.54		Q_{23}8	
74.843	1	682.33			
74.936	9	682.10		Q_2 7	
74.997	4	681.95	Q_1 14		
75.073	7	681.77		R_2 1	P_3 7
75.138	10	681.61	R_1 7		
75.246	1	681.34			
75.327	1	681.14			
75.405	8	680.95		Q_{21}7	
75.457	9	680.82		R_{21}1	
75.521	8	680.67		Q_{23}7	
75.591	6	680.49		Q_2 6	
75.962	1	679.58			
76.055	7	679.35		Q_{21}6	
76.090	7	679.26			P_3 8

λ	I	ν	Classification 9-6		
6376.153	8	15 679.11		Q_2 5	
76.191	7	679.01		Q_{23}6	
76.281	1	678.79	Q_{12}13		
76.453	1	678.37			
76.610	10	677.99	[R_{21}0	Q_{21}5	Q_2 4]
76.682	1	677.81			
76.761	10	677.61	Q_1 13	Q_{23}5	
76.847	1	677.40			
76.932	7	677.20			P_3 9
76.975	5	677.09		Q_2 3	
77.054	5	676.90		Q_{21}4	
77.153	1	676.65			
77.247	8	676.42		Q_2 2	Q_{23}4]
77.324	2	676.23			
77.409	8	676.02		Q_{21}3	Q_2 1]
77.504	1	675.79			
77.578	8	675.61	R_1 6		
77.647	10	675.44	[Q_{23}3	Q_{21}2	P_3 10
77.787	2	675.09		Q_{21}1	
77.869	1	674.89			
77.944	1	674.71			
78.006	9	674.56	Q_{12}12	Q_{23}2	
78.081	1	674.37			
78.157	7	674.18			P_3 11
78.266	1	673.92			
78.386	3	673.62			P_3 17
78.460	10	673.44	Q_1 12	Q_{23}1	
78.532	4	673.26			P_3 12
78.670	2	672.92			P_3 16
78.775	5	672.66			P_3 13
78.833	3	672.52			P_3 15
78.882	3	672.40			P_3 14
79.243	1	671.52			
79.350	3	671.25			
79.475	1	670.94			
79.606	5	670.63	Q_{12}11	P_2 2	
79.668	2	670.47			
79.838	1	670.05			
79.903	1	669.90			
79.970	10	669.73	R_1 5		
80.034	[illegible]	669.57			
80.082	10	669.45	Q_1 11		
80.231	1	669.09			
80.360	9	668.77		P_{23}2	
80.515	1	668.39		P_2 3	
80 628	3	668.11			
80.799	1	667.69			
81.052	1	667.07			
81.189	10	666.73	Q_{12}10	P_{23}3	
81.346	2	666.35		P_2 4	
81.503	1	665.97			
81.644	9	665.62	Q_1 10		
81.717	1	665.44			
81.850	1	665.11			
81.983	10	664.79		P_{23}4	

λ	I	ν	Classification 9-6		
6382.086	4	15 664.53		P_2 5	
82.220	1	664.21			
82.318	9	663.97	R_1 4		
82.540	1	663.42			
82.696	10b	663.04	Q_{12}9	P_{23}5	P_2 6}
82.839	1	662.69			
82.984	3	662.33			
83.068	1	662.12			
83.143	10	661.94	Q_1 9		
83.218	1	661.75			
83.273	5	661.62		P_2 7	
83.328	9	661.49		P_{23}6	
83.405	1	661.30			
83.473	2	661.13			
83.525	7	661.00		O_{23}3	
83.642	1	660.72			
83.727	5	660.51		P_2 8	
83.796	1	660.34		P_2 15	
83.866	10	660.16		P_{23}7	
83.982	1	659.88			
84.071	6	659.66		P_2 9	
84.112	5	659.57	Q_{12}8		
84.191	2	659.37			
84.252	1	659.22			
84.312	9	659.07		P_{23}8	P_2 10]
84.394	4	658.87		P_2 13	
84.457	7	658.72	[P_2 11	P_2 12	
84.513	1	658.58			
84.[illegible]82	10	658.41	Q_1 8		
84.[illegible]	10b	658.25	R_1 3	P_{23}9	
84.7[illegible]	2	657.94		P_{23}15	
84.886	6	657.66		P_{23}10	
84.957	4	657.49		P_{23}13	
85.023	7	657.33		P_{23}11	P_{23}12]
85.160	1	656.99			
85.312	1	656.62			
85.415	1	656.37			
85.497	10	656.16	Q_{12}7	O_{23}4	
85.643	1	655.81			
85.811	1	655.40			
85.906	1	655.17			
85.970	10b	655.01	Q_1 7		
86.213	1	654.41			
86.537	1	653.62			
86.684	2	653.26			
86.773	1	653.04			
86.846	6	652.86	Q_{12}6		
86.895	7	652.74	R_1 2		
87.014	1	652.45			
87.174	3	652.05			
87.232	1	651.91			
87.307	10	651.73	Q_1 6		
87.370	10	651.57		O_{23}5	
87.566	1d	651.09			
87.936	1d	650.19			

λ	I	ν	Classification 9-6		
6388.146	10	15 649.67	Q_{12}5		
88.222	1	649.49			
88.353	1d	649.17			
88.526	1	648.74			
88.603	10b	648.56	Q_2 5		
88.889	1bd	647.85			
89.022	0d	647.53	P_1 17		
89.110	8	647.32	R_1 1		
89.169	7	647.17		O_{23}6	
89.293	1	646.86			
89.404	7	646.60	Q_{12}4	P_{12}16}	
89.769	1	645.71			
89.852	10	645.50	Q_1 4	P_1 16]	
89.941	1	645.28			
90.168	2	644.72	P_{12}15		
90.633	10	643.58	Q_{12}3	P_1 15]	
90.763	1	643.25			
90.877	10	642.98	P_{12}14	O_{23}7	
90.983	2	642.73			
91.062	10b	642.53	Q_1 3		
91.136	1	642.35			
91.203	1	642.19			
91.259	4	642.05	R_1 0		
91.326	3	641.89	P_1 14		
91.434	5	641.62	P_{12}13		
91.634	1	641.13			
91.734	1	640.89			
91.822	6	640.68	Q_{12}2		
91.920	6	640.44	P_1 13		
91.961	4	640.34	P_{12}12		
92.141	1	639.89			
92.233	10	639.67	Q_1 2		
92.313	1	639.48			
92.371	1	639.34			
92.421	9	639.27	P_{12}11	P_1 1[illegible]	
92.486	7	639.05		O_{23}8	
92.675	1	638.59			
92.749	1	638.41			
92.815	7	638.25	P_{12}10		
92.904	8	638.03	P_1 11		
92.985	7	637.84	Q_{12}1	P_{23}11	
93.037	1	637.65			
93.108	1	637.53			
93.152	10	637.43	P_{12}9		
93.212	2	637.28			
93.253	1	637.17			
93.295	7	637.07	P_1 10		
93.359	10	636.92	Q_1 1		
93.428	9	636.75	P_{12}8	P_{23}10	
93.495	1	636.58			
93.551	2	636.45			
93.595	1	636.34			
93.624	10	636.27	P_1 9		
93.669	10	636.15	P_{12}7		
93.731	1	636.01	P_{23}9		

λ	I	ν	Classification 9-6		
6393.787	1	15 635.87			
93.846	10	635.72	$P_{12}6$		
93.907	8	635.58	P_{1} 8		
93.994	10b	635.36	$P_{12}5$	$O_{23}9$	$P_{13}8]$
94.058	1	635.20			
94.111	10	635.08	$P_{12}4$	P_{1} 7]	
94.192	10	634.88	$P_{12}3$		
94.254	10	634.72	$P_{12}2$	$P_{13}7]$	
94.302	10	634.61	P_{1} 6	$P_{12}1]$	
94.394	6	634.39	Q_{1} 0		
94.450	10	634.25	P_{1} 5	$P_{13}6]$	
94.505	1	634.11			
94.553	8	634.00	P_{1} 4		
94.617	10	633.84	P_{1} 3	P_{1} 0]	$P_{13}5]$
94.662	10	633.73	P_{1} 2	P_{1} 1	
94.738	0	633.55	$P_{13}4$		
94.883	0	633.19	$P_{13}3$		
95.097	1	632.67			
95.265	1	632.25			
95.400	5	631.93		$O_{23}10$	
96.328	10	629.66	$O_{12}1$		
96.601	1	628.99			
96.706	7	628.74		$O_{23}11$	
97.009	1	627.99			
97.190	1	627.56			
97.398	9	627.05	$O_{12}2$	$O_{13}1]$	
97.620	1	626.50			
97.809	1	626.04			
97.905	4	625.81		$O_{23}12$	
98.054	1	625.44			
98.169	4	625.16	$O_{13}2$		
98.262	1	624.94			
98.354	3	624.71	$N_{13}2$		
98.445	10	624.49	$O_{12}3$		
98.631	1	624.03			
98.739	1	623.77			
98.878	1	623.43			
99.002	5	623.13		$O_{23}13$	
99.067	1	622.97			
99.123	6	622.83	$O_{13}3$		
99.325	1	622.35			
99.462	9	622.01	$O_{12}14$		
99.579	1	621.72			
6400.101	5	620.44	$O_{13}4$		
00.342	1	619.86			
00.448	10	619.60	$O_{12}5$	$N_{13}3]$	
00.720	1	618.93			
00.851	2	618.62		$O_{23}15$	
01.068	7	618.09	$O_{13}5$		
01.227	1	617.70			
01.407	9	617.26	$O_{12}6$		
01.597	1	616.90			
01.777	2	616.36			
02.011	5	615.79	$O_{13}6$		
02.165	1	615.41			

λ	I	ν	Classification 9-6		8-5	
6402.329	10	15 615.01	$O_{12}7$			
02.432	1	614.76				
02.538	6	614.50	$N_{13}4$			
02.677	1	614.16				
02.838	1	613.77				
02.920	6	613.57	$O_{13}7$			
03.088	1	613.16				
03.209	8	612.86	$O_{12}8$			
03.393	1	612.42				
03.641	1	611.81				
03.799	4	611.43	$O_{13}8$			
03.978	1	610.99				
04.047	10	610.82	$O_{12}9$			
04.112	1	610.66				
04.348	1d	610.09				
04.539	1d	609.62				
04.640	8	609.38	$O_{13}9$	$N_{13}5]$		
04.740	1	609.13				
04.832	6	608.91	$O_{12}10$			
05.005	1	608.48				
05.231	1	607.94				$S_{23}12$
05.419	2	607.48	$O_{13}10$			
05.499	1	607.28				
05.560	8	607.13	$O_{12}11$			
05.698	1	606.80				
06.060	1	605.92				
06.139	2	605.72	$O_{13}11$			
06.229	4	605.50	$O_{12}12$			
06.362	1	605.18				
06.615	2	604.56				
06.736	4	604.27	$N_{13}6$			
06.835	5	604.03	$O_{12}13$	$O_{23}12]$		
07.113	1	603.35				
07.356	2bd	602.76	$O_{13}13$		$S_{23}13$	
07.457	1	602.51	$O_{12}14$			
07.841	3	601.58	$O_{13}15$			
08.024	1	601.13				
08.566	4	15 599.81				$S_{23}11$
08.679	1	599.54				
08.800	7	599.24	$N_{13}7$			
08.974	1	598.82				
09.237	1	5 8.18				
09.326	2	5 7.96				$T_{23}7$
09.507	1	7.52				
09.617	1	7.25				
09.725	1	[illegible]				
09.963	2	596.				
10.241	1	595.74				
10.595	1	594.88				
10.830	3	594.30	$N_{13}8$			
10.946	1	594.02				
11.062	2	593.74			$S_{23}12$	
11.146	1	593.54				
11.351	1	593.04				
11.652	1	592.31				

λ	I	ν	Classification 9-6	8-5		λ	I	ν	Classification	8-5	
6411.782	2	15 591.99			S_{22} 10	6423.895	8	15 562.59			T_{31}3
12.265	1d	590.81			S_{21} 10	23.997	6	562.34			R_{32}11
12:516	1	590.20				24.206	1	561.83			
12.651	2	589.88				24.397	2	561.37			
12.834	4	589.43	N_{13}9			24.586	7	560.92			R_3 11
13.077	1	588.84				24.864	1	560.24			
13.202	2	588.53			T_{31}6	24.959	4	560.01		S_{21} 8	
13.618	1	587.52				25.020	3	559.86			
13.882	1	586.88				25.101	1	559.67			
14.091	1	586.38				25.207	1	559.41			
14.191	2	586.13				25.297	4	559.19		R_4 13	
14.475	1	585.44				25.442	1	558.84			
14.607	1	585.12				25.630	10	558.39			S_{32} 5
14.691	3	584.92		S_{21} 11		25.799	3b	557.98		R_{21}13	
14.776	2	584.71	N_{13}10			25.975	4	557.55			R_{32}10
14.838	5	584.56			S_{32} 9	26.092	7	557.27	R_4 15		S_{31} 5
15.025	1	584.11				26.399	1	556.52			
15.217	2	583.64				26.474	0	556.34			R_{31}10
15.335	4	583.35			S_{21} 9	26.555	6	556.15			R_3 10
16.011	2	581.71				26.697	4	555.30			
16.139	1	581.40				26.960	2	555.17			
16.239	1	581.16				27.097	7	554.84			T_{21}2
16.319	2	580.96				27.214	1	554.55			
16.442	1	580.66				27.557	1bd	553.72			
16.690	2	580.06	N_{13}11			27.720	2	553.33			
16.838	1	579.70				27.798	9	553.14		R_3 12	R_{21}9
16.935	5	579.47			T_{31}5	27.917	9	552.85			S_{32}4
17.152	1d	578.94				28.058	2	552.51			
17.768	4	577.45			S_{32} 8	28.171	9	552.24		S_{31} 7	
17.054	1	577.24			R_3 14	28.302	3	551.92		R_{31}12	R_{21}9
17.982	1d	576.93				28.384	10	551.72		[S_{21} 4	R_4 9
18.231	3	576.32		S_{21} 10	S_{31} 6	28.531	1	551.36			
18.542	0	575.57	N_{13}12			28.631	2	551.12			
19.651	2	572.88			R_{32}13	28.908	1d	550.45			
19.758	2	572.62				29.047	2	550.12			
19.969	1	572.11		R_3 15		29.130	2	549.92	R_4 14		
20.060	1	571.84				29.325	2	549.44			
20.231	4	571.47			R_3 13	29.471	8	549.09			R_{44}8
20.333	0	571.22	N_{13}13			29.749	1	548.43			
20.467	2	570.90		R_{31}12	T_{31}4	29.881	1	548.10			
20.543	9	570.71			S_{30} 7	29.984	1	547.90			R_{31}6
20.670	1	570.41				30.034	10	547.73			S_{34}3
20.816	1	570.05				30.100	10	547.57		[T_{21}1	R_4 8
21.022	3	569.55			S_{31} 7	30.229	7	547.26		R_3 11	
21.255	2	568.99				30.404	1	546.83			
21.639	5	568.05		S_{21} 9		30.480	9	546.65			S_{31} 3
21.903	2	567.42			R_{32}12	30.720	6	546.07		R_{21}11	
22.477	3	566.02			R_3 12	30.909	1	545.61			
22.569	1	565.80				30.986	10	545.43			R_{32}7
22.704	1	563.47		R_3 14		31.150	1	545.03			
22.968	1bd	564.84				31.239	7	544.72		S_{21} 6	
23.085	1	564.55				31.463	2	544.15			R_{31}7
23.169	8	564.35			S_{32} 4	31.535	10	543.98			R_3 7
23.386	1	563.69				31.703	2	543.69			Q_3 17
23.646	3	563.19			S_{31} 6	31.770	1	543.53			

λ	I	ν	Classification 8-5		
6431.885	1	15 543.26			
31.961	10	543.07			S_{32}2
32.011	2	542.95			
32.099	5	542.74	R_1 13		
32.333	9	542.17			R_{32}6
32.389	8	542.04			S_{31}2
32.463	1	541.86			
32.530	4	541.70		R_2 10	
32.793	2	541.06			R_{31}6
32.865	9	540.89			T_{31}0
32.945	9	540.69			R_3 6
33.014	5	540.53		R_{22}10	
33.136	1	540.23			
33.222	2	540.02			Q_3 16
33.329	1	539.77			
33.441	1	539.50			
33.515	10	539.32			R_{32}5
33.614	1	539.08			
33.693	10	538.89			S_{32}1
33.766	1	538.71			
33.848	1	538.51			
33.929	4	538.32			
33.991	4	538.17			R_{31}5
34.068	9	537.98			S_{31}1
34.138	10	537.81			R_3 5
34.210	1	537.64			
34.282	10	537.47		S_{21}5	
34.437	1	537.09			
34.510	10	536.91			R_{32}4
34.620	5	536.65			Q_3 15
34.720	7	536.41		R_2 9	
34.799	1	536.22			
34.898	1	535.98			
34.989	5	535.76	R_1 12		R_{31}4
35.085	1	535.53			
35.157	9	535.35			R_3 4
35.210	9	535.22		R_{21}9	
35.319	10	534.96		[Q_{32}14	R_{32}3
35.393	1	534.78			
35.492	1	534.54			
35.615	1d	534.25			
35.772	6	533.87			R_{31}3
35.879	4	533.61			Q_3 14
35.937	8	533.47			R_{32}2
36.015	10	533.28			R_3 3
36.202	1bd	532.83			
36.347	1	532.48			R_{31}2
36.449	2	532.23			Q_{32}13
36.530	1	532.04			
36.719	6	531.58			R_3 2
36.805	5	531.37		R_2 8	
36.913	1	531.11			
37.026	7	530.84			Q_3 13
37.114		530.63			
37.192	8	530.44		S_{21}4	

λ	I	ν	Classification 8-5		
6437.290	8	15 530.20		R_{21}8	
37.445	1	529.83			Q_{32}12
37.533	2	529.62			
37.697	1	529.22			
37.818	8	528.93	R_1 11		
37.903	1	528.73			
38.019	7	528.45			Q_3 12
38.097	1	528.26			
38.173	4	528.08			
38.293	5	527.79			Q_{32}11
38.453	1	527.40			
38.568	1	527.12			
38.789	9	526.59		R_2 7	
38.879	10	526.37			Q_3 11
39.002	4	526.07			Q_{31}10
39.089	2	525.87		Q_2 15	
39.170	6	525.67			
39.270	10	525.43		R_{21}7	Q_{32}3
39.426	1	525.05			
39.576	9d	524.69		[Q_3 10	Q_{32}9
39.669	1	524.47			
39.748	1	524.28			
39.815	5	524.11			Q_{32}4
39.907	1	523.89			
39.984	10b	523.71	[Q_{32}8	S_{21}3	Q_3 3
40.063	1	523.52			
40.146	10b	523.32	[Q_{32}5	[Q_{32}7	Q_3 9
40.236	5	523.10			Q_{32}6
40.311	1	522.92			
40.383	2	522.75			
40.462	9	522.56			Q_3 4
40.554	10	522.33	R_1 10		Q_3 8
40.660	6	522.08		R_2 6	
40.739	10	521.89			Q_3 5
40.787	10	521.77			Q_3 7
40.856	10	521.61			Q_3 6
40.947	1	521.39			
41.031	1	521.18			
41.133	10	520.94		R_{41}6	
41.332	1	520.46			
41.618	1	519.77			
41.913	1	519.06			
42.037	1	518.76			
42.130	7	518.54		Q_2 13	
42.432	9	517.81		R_2 5	
42.513	5	517.61			
42.605	2	517.39		Q_{41}13	
42.675	9	517.22		S_{41}2	Q_{22}13
42.815	1	516.89			
42.896	10	516.69		R_{31}5	
43.065	2	516.28			
43.168	1	516.04			
43.260	10	515.81	R_1 9		
43.361	1	515.57			
43.443	6	515.37		Q_2 12	

λ	I	ν	Classification 8-5		
6443.676	1	15 514.81			
43.762	1	514.61			
43.857	1	514.38			
43.937	2	514.18		Q_{21}12	
44.026	3	513.97		Q_{23}12	
44.094	5	513.81		R_2 4	
44.317	1bd	513.27			
44.446	2	512.96			P_3 4
44.566	10	512.67		R_{21}4	
44.652	10	512.46		Q_2 11	
44.931	1	511.79			
45.038	1	511.53			
45.157	5	511.25		Q_{21}11	
45.248	10	511.03		S_{21} 1	Q_{23}11]
45.409	1	510.64			
45.544	1	510.32			
45.675	7	510.00		R_2 3	
45.758	8	509.80		Q_2 10	
45.823	1	509.64			
45.887	9	509.49	R_1 8		
45.967	1	509.30			
46.048	7	509.10	Q_{12}15		P_3 5
46.110	10	508.96		R_{21}3	
46.178	2	508.79			
46.249	4	508.62		Q_{21}10	
46.338	4	508.41		Q_{23}10	
46.467	1	508.10			
46.523	6	507.96	Q_1 15		
46.656	1	507.64			
46.743	10	507.43		Q_2 9	
47.071	1	506.64			
47.146	3	506.46		R_2 2	
47.237	7	506.24		Q_{21}9	
47.338	8	506.00		Q_{23}9	
47.475	6	505.67			P_3 6
47.562	9	505.46		R_{21}2	
47.629	7	505.30		Q_2 8	
47.679	6	505.18		S_{21} 0	
47.921	2	504.60	Q_{12}14		
48.028	1	504.34			
48.119	5	504.12		Q_{21}8	
48.235	6	503.84		Q_{23}8	
48.326	1	503.63			
48.406	10	503.43	Q_1 14	Q_2 7	
48.459	10	503.30	R_1 7		
48.529	2	503.14		R_2 1	
48.706	10	502.71			P_3 7
48.830	1	502.41			
48.903	10	502.24		R_{21}1	Q_{21}7]
49.008	9	501.99		Q_{23}7	
49.078	8	501.82		Q_2 6	
49.196	1	501.53			
49.396	1hd	501.05			
49.564	8	500.65		Q_{21}6	
49.653	9	500.44		Q_2 5	

λ	I	ν	Classification 8-5		
6449.704	8	15 500.31	Q_{12}13	Q_{23}6	
49.768	7	500.16			P_3 [illegible]
49.841	1	15 499.98			
49.910	1	499.82			
49.981	1	499.65			
50.056	1	499.47			
50.121	10	499.31	[R_{21} 0	Q_2 4	Q_{21}5]
50.219	9	499.07	Q_1 13		
50.280	10	498.93		Q_{23}5	
50.336	2	498.79			
50.421	1	498.59			
50.494	7	498.41		Q_2 3	
50.584	8	498.20		Q_{21}4	
50.653	9	498.03			P_3 9
50.713	1	497.89			
50.778	10	497.73		Q_2 2	Q_{23}4]
50.853	1	497.55			
50.897	1	497.45			
50.933	10	497.36		Q_2 1	Q_{21}3]
50.974	10	497.26	R_1 6		
51.040	1	497.10			
51.112	1	496.93			
51.187	10	496.75		Q_{21}2	Q_{23}3]
51.259	2	496.58			
51.320	4	496.43		Q_{21}1	
51.371	6	496.31			P_3 10
51.463	3	496.09	Q_{12}12		
51.554	10	495.87		Q_{23}2	
51.694	1	495.53			
51.830	3	495.20			
51.926	9	494.97			P_3 11
51.962	8	494.89	Q_1 12		
52.026	10	494.73		Q_{23}1	
52.099	1	494.56			
52.169	1	494.39			
52.235	2	494.23			
52.331	4	494.00			P_3 12
52.417	1	493.79			
52.516	1	493.56			
52.591	6	493.38			P_3 13
52.691	5	493.14			P_3 14
52.991	1	492.42			
53.139	5	492.06	Q_{12}11	P_2 2	
53.275	1d	491.74			
53.368	1	491.51			
53.440	10	491.34	R_1 5		
53.533	1	491.12			
53.628	10	490.89	Q_1 11		
53.872	1	490.30			
53.992	10	490.01		P_{23}2	
54.158	2	489.62		P_2 3	
54.256	1	489.38			
54.373	4	489.10			
54.456	2	488.90			
54.537	1	488.71			

λ	I	ν	Classification 8-5		
6454.613	1	15 488.52			
54.689	2	488.34			
54.743	4	488.21	$Q_{12}10$		
54.856	10b	487.94		$P_{23}3$	
55.042	2b	487.49		P_2 4	
55.131	1	487.25			
55.231	10	487.04	Q_1 10		
55.340	5	486.78			
55.536	2	486.31			
55.598	1	486.16			
55.686	10	485.95		$P_{23}4$	
55.801	5	485.67		P_2 5	
55.862	9	485.53	R_1 4		
55.984	3	485.23			
56.202	1	484.71			
56.284	8	484.51	$Q_{12}9$		
56.358	1	484.34			
56.432	10b	484.16		$P_{23}5$	
56.492	2	484.02		P_2 6	
56.593	1	483.77			
56.689	2	483.54			
56.769	10	483.35	Q_1 9		
56.898	2	483.04			
57.061	9	482.65		P_2 7	
57.104	10	482.55		$P_{23}6$	
57.188	1	482.35			
57.282	9	482.12		$O_{23}3$	
57.411	1	481.81			
57.482	2	481.64			
57.535	5	481.52		P_2 8	
57.594	2	481.37			
57.665	10	481.20		$P_{23}7$	
57.758	7	480.98	$Q_{12}8$		
57.824	2	480.82			
57.905	8	480.63		P_2 9	
57.995	1	480.41		P_2 15]	
58.077	1	480.22			
58.141	9d	480.06	P_2 10		
58.245	10	479.81	Q_1 3	P_2 14	R_1 3]
58.313	7	479.65		P_2 11	P_2 13
58.397	2	479.45		P_2 12	
58.496	10	479.21		$P_{23}9$	
58.583	1	479.00			
58.686	3	478.76			
58.757	8	478.59		$P_{23}10$	
58.819	1	478.44			
58.892	9b	478.26		$P_{23}11$	$P_{23}13$]
58.942	4	478.14		$P_{23}12$	
59.040	1	477.91			
59.112	1	477.74			
59.189	10	477.55	$Q_{12}7$		
59.317	9	477.24		$O_{23}4$	
59.456	2	476.91			
59.538	3	476.72			
59.601	2	476.56			

λ	I	ν	Classification 8-5		
6459.670	10b	15 476.40	Q_1 7		
59.836	2	476.00			
60.059	1	475.77			
60.450	3	474.53			
60.577	10	474.23	$Q_{12}6$	R_1 2]	
60.664	1	474.02	$P_{12}19$		
60.845	1d	473.58			
60.967	1	473.29			
61.044	10	473.11	Q_1 6		
61.158	1	472.83			
61.220	1	472.69			
61.274	10	472.56		$O_{23}5$	
61.402	1	472.25			
61.518	2	471.97			
61.661	1	471.63	$P_{12}18$		
61.902	10	471.05	$Q_{12}5$		
62.163	3	470.43			
62.226	1	470.28			
62.296	2	470.11			
62.370	10b	469.93	Q_1 5		
62.584	1	469.42	$P_{12}17$		
62.727	1	469.08			
62.823	2	468.85			
62.883	10	468.70	R_1 1		
62.992	1	468.44			
63.083	2	468.23	P_1 17		
63.143	9	468.08		$O_{23}6$	
63.200	8	467.95	$Q_{12}4$		
63.326	1	467.64			
63.421	2	467 42	$P_{12}16$		
63.528	3	467.16			
63.654	10	466.86	Q_1 4		
63.920	2	466.22	P_1 16		
64.042	1	465.93			
64.174	3	465.61	$P_{12}15$		
64.365	1	465.16			
64.459	10	464.93	$Q_{12}3$		
64.534	1	464.75			
64.607	1	464.58			
64.677	5	464.41	P_1 15		
64.772	2	464.18			
64.829	2	464.05	$P_{12}14$		
64.907	10b	463.86	Q_1 3	$O_{23}7$	
64.982	1	463.68			
65.106	5	463.39	R_1 0		
65.183	1	463.20			
65.262	2	463.01			
65.353	4	462.80	P_1 14		
65.451	6	462.56	$P_{12}13$		
65.543	1	462.34			
65.682	7	462.01	$Q_{12}2$		
65.817	2	461.69			
65.887	1	461.52			
65.953	8	461.36	$P_{12}12$	P_2 13]	
66.036	1	461.16	$P_{12}13$		

λ	I	ν	Classification 8-5		
6466.107	10	15 460.95	Q_1 2		
66.268	1	460.61			
66.377	2	460.35			
66.427	9	460.23	P_{12}11		
66.472	7	460.12	P_1 12		
66.548	1	459.94	P_{13}12		
66.608	8	459.79		O_{23}8	
66.729	1	459.50			
66.821	8	459.29	P_{12}10		
66.887	7	459.13	Q_{12}1		
66.931	9	459.02	P_1 11		
67.012	2	458.83	P_{13}11		
67.078	1	458.67			
67.152	10	458.49	P_{12}9		
67.211	1	458.35			
67.268	10	458.22	Q_1 1		
67.320	9	458.09	P_1 10		
67.367	1	457.98			
67.423	10	457.85	P_{12}8	P_{13}10]	
67.498	1	457.67			
67.566	3	457.50			
67.643	10b	457.32	P_{12}7	P_1 9]	
67.746	2	457.07	P_{13}9		
67.828	10	456.88	P_{12}6		
67.907	9	456.69	P_1 8		
67.971	10	456.54	P_{12}5		
68.071	10	456.30	P_{12}4		
68.150	10b	456.11	P_{12}3	O_{13}9	P_1 7]
68.239	10	455.90	P_{12}1	P_{12}2]	P_{13}7]
68.301	8	455.75	P_1 6		
68.355	8	455.62	Q_1 0		
68.435	10	455.43	P_1 5	P_{13}6]	
68.531	10	455.20	P_1 4	P_1 0]	
68.617	10b	454.99	P_1 1-3	P_{12}5]	
68.725	1	454.72	P_{13}4		
68.838	2	454.46	P_{13}3		
69.381	1bd	453.17			
69.654	8	452.51		O_{23}10	
70.053	1d	451.56			
70.195	1	451.22			
70.274	1	451.03			
70.347	10	450.86	O_{12}1		
70.430	1	450.66			
70.829	1d	449.71			
71.023	10	449.25		O_{23}11	
71.333	1	448.51			
71.459	10	448.20	O_{12}2		
71.595	1	447.88			
71.833	1	447.31			
71.927	1	447.09			
72.009	2	446.89			
72.125	1	446.62			
72.201	1	446.44			
72.272	6	446.26	O_{13}2	O_{23}12	
72.358	1	446.06			

λ	I	ν	Classification 8-5		7-4
6472.458	4	15 445.82	N_{13}2		
72.545	10b	445.61	O_{12}3		
72.634	1	445.40			
72.775	2	445.06			
73.043	1	444.43			
73.253	8	443.92	O_{13}3		
73.338	1	443.72			
73.427	6	443.51		O_{23}13	
73.527	1	443.27			
73.613	10	443.07	O_{12}4		
73.734	1	442.78			
74.270	6	441.50	O_{13}4		
74.460	2	441.04		O_{23}14	
74.536	1	440.86			
74.609	8	440.69	N_{13}3		
74.647	10	440.60	O_{12}5		
74.836	2	440.15			
75.136	1	439.43			
75.283	9	439.08	O_{13}5		T_{31}9
75.390	2	438.83		O_{23}15	
75.544	1	438.46			
75.653	10	438.20	O_{12}6		
75.833	1	437.77			
75.977	2	437.43			S_{32}13
76.173	1d	436.96			
76.274	5	436.72	O_{13}6		
76.429	2	436.35			
76.536	1	436.10			
76.623	10b	435.89	O_{12}7		
76.696	1	435.71			
76.805	5	435.44	N_{13}4		
76.874	1	435.29			
76.940	3	435.13			
77.067	1	434.83			
77.143	1	434.65			
77.230	9	434.44	O_{13}7		
77.343	2	434.17			
77.450	1	433.92			
77.547	10	433.69	O_{12}8		
77.640	1	433.46			
77.910	3	432.82			
77.992	1	432.62			
78.152	4	432.24	O_{13}8		
78.217	1	432.09			
78.341	2	431.79			
78.426	10	431.59	O_{12}9		
78.503	1	431.41			
78.597	2	431.18			
78.924	2	430.41			
79.009	9	430.20	O_{13}9	N_{13}5]	
79.094	1	430.00			
79.176	1	429.81			
79.260	8	429.61	O_{12}10		
79.340	1	429.42			
79.426	2	429.21			

λ	I	ν	Classification 8-5		7-4	
6479.489	1	15 429.06				
79.561	2	428.89				S_{32} 12
79.610	2	428.77				T_{31} 8
79.768	1	428.40				
79.858	2	428.18	O_{12} 10			
79.953	1	427.96				
80.036	10	427.76	O_{12} 11			
80.273	1d	427.19				
80.383	3	426.93				
80.488	1	426.68				
80.553	1	426.53				
80.639	3	426.32	O_{13} 11			
80.744	4	426.07	O_{12} 12			
80.838	1	425.85				
80.926	4	425.64				
81.177	6	425.04	N_{13} 6			
81.278	1	424.80				
81.335	3	424.67	O_{13} 12			
81.398	5	424.51	O_{12} 13			
81.614	3	424.00				
81.709	3	423.78				
81.806	1	423.55				
81.898	5	423.32				
81.983	3	423.12	O_{12} 14	O_{13} 13		
82.165	3	422.69				
82.432	1	422.06				
82.488	4	421.92	O_{12} 15			
82.601	3	421.65				
82.705	9	421.41	*			
82.778	1	421.23				
82.863	2	421.03				
82.928	3	420.88	O_{12} 16			
83.014	4	420.67				S_{32} 11
83.177	1	420.28				
83.257	1	420.09				
83.329	7	419.92	N_{13} 7	O_{12} 17		
83.457	4	419.62				
83.524	1	419.46				S_{31} 11
83.642	1	419.18	O_{12} 18			
83.752	8	418.92				T_{31} 7
83.942	1	418.46				R_{32} 17
84.073	1	418.15				
84.306	2	417.60				
84.460	2	417.23				
84.540	2	417.04				R_3 17
84.746	3	416.55				
84.811	7	416.40	#			
85.460	4	414.85	N_{13} 8		S_{21} 12	
85.542	2	414.66				
85.657	3	414.39				
85.800	4	414.05				
85.932	2	413.73				
86.220	1	413.05				
86.327	3	412.80				S_{32} 10
86.820	1	411.62			[S_{31} 10	R_{32} 16

λ	I	ν	Classification 8-5		7-4	
6487.026	1	15 411.13				
87.191	1	410.74				
87.342	3b	410.38				R_3 16
87.446	2	410.14				
87.540	4	409.91	N_{13} 9			
87.791	3	409.32				T_{32} 6
88.542	1	407.53				
88.818	3	406.88			R_2 17	
88.965	2	406.53				
89.230	9	405.90			S_{32} 11	
89.356	1	405.60				
89.498	9	405.26			[R_{32} 15	S_{32} 9
89.582	1	405.06	N_{13} 10			
89.804	2	404.54				
89.995	2	404.08			[R_{31} 15	S_{31} 9
90.080	3	403.88				R_3 15
90.164	1d	403.68				
91.064	1	401.55		R_1 18		
91.159	3	401.32				
91.582	2	400.32	N_{13} 11			
91.652	8	400.15				T_{31} 5
91.835	1	15 399.72			R_2 14	
92.096	2bd	399.10				R_{32} 14
92.290	1	398.64				
92.530	8	398.07				S_{32} 8
92.662	3	397.76				R_2 14
92.726	2	397.61				
92.872	3	397.26			S_{32} 10	
92.956	2	397.06				
93.034	2	396.87				S_{31} 8
93.243	6	396.38				
93.523	1	395.72	N_{13} 12			
93.668	1	395.37				
94.454	2	393.51		[R_1 17		
94.525	5	393.34				R_{32} 13
94.763	3	392.77			R_2 15	
95.115	8	391.94				R_3 13
95.202	1	391.74				
95.263	2	391.59			R_{31} 15	
95.348	7	391.39				T_{31} 4
95.407	10	391.25	N_{13} 13			S_{33} 7
95.496	2	391.04				
95.695	1	390.56				
95.772	3	390.38				
95.898	5	390.08				S_{31} 7
95.987	4	389.87				
96.235	4	389.29				
96.408	9	388.88			S_{32} 9	
96.645	2	388.32				
96.711	2	388.16				
96.835	4	387.87				R_{32} 12
97.383	2	386.57				
97.432	5	386.45				R_3 12
97.577	2	386.11			R_2 14	
97.764	2	385.66		R_1 16		

*N I line 6482.76
#N I line 6484.88

λ	I	ν	Classification 7-4		
6497.928	5	15 385.28			
98.047	2	385.00			
98.124	10	384.81			S_{32} 6
98.247	1	384.52			
98.611	5	383.66			S_{31} 6
98.868	10	383.05			T_{31}3
98.948	1	382.86			
99.017	9	382.70			R_{32}11
99.545	2	381.45			R_{31}11
99.620	10	381.27			R_3 11
99.836	7	380.76		S_{21} 8	
99.917	1	380.57			
6500.008	2	380.36			
00.270	6	379.73		R_2 13	
00.535	4	379.11			
00.599	2	378.95			
00.673	10	378.78			S_{32}
00.771	4	378.55		R_{21}13	
00.863	1	378.33			
00.972	5	378.07	R_1 15		
01.054	7	377.88			R_{32}10
01.153	10	377.65			S_{31} 5
01.429	2b	376.99			
01.540	1	376.73			R_{31}10
01.656	9	376.46			R_3 10
02.116	2	375.37			
02.193	10	375.18			T_{31}2
02.371	2	374.76			
02.492	1	374.48			
02.865	4	373.60		R_2 12	
02.940	10	373.42			R_{32}9
03.049	10	373.16			S_{32} 4
03.161	10	372.90		S_{21} 7	
03.242	1	372.71			
03.310	3	372.55			
03.369	4	372.40		R_{21}12	Q_3 19
03.448	2	372.22			R_{31}?
03.536	10b	372.01		[R_3 9	S_{31} 4
03.775	3	371.44			
03.873	4	371.21			
04.114	3	370.65	R_1 14		
04.669	10	369.33			R_{32}8
04.754	1	369.13			
05.035	2	368.47			
05.105	1	368.30			
05.169	4	368.15			R_{31}8
05.243	10	367.98		[R_3 8	S_{32} 3
05.318	10	367.80		R_2 11	T_{31}1
05.702	10	366.89			S_{31} 3
05.774	1	366.72			
05.848	9	366.55		R_{21}11	
05.926	1	366.36			
06.030	2	366.12			
06.155	1	365.82			
06.240	10	365.62			R_{32}7

λ	I	ν	Classification 7-4		
6506.306	1	15 365.47			
06.379	9	365.29		S_{21} 6	
06.725	3	364.48			R_{32}7
06.782	2	364.34			
06.853	10	364.17			R_3 7
07.066	6	363.67			Q_3 17
07.173	7	363.42	R_1 13		
07.246	10	363.25			S_{32} 2
07.425	1d	362.82			
07.638	10	362.32			R_{32}6
07.671		362.24			S_{31} 2
07.714		362.14		R_2 10	
07.791	1	361.96			
08.048	5	361.35			Q_{32}16
08.127	2	361.17			R_{31}6
08.179	10	361.04		R_{21}10	T_{31}0
08.269	10	360.83			R_3 6
08.641	4	359.95			Q_3 16
08.712	1	359.79			
08.784	5	359.61			
08.860	10b	359.44			R_{32}5
08.950	1	359.22			
09.047	10b	358.99			S_{32} 1
09.173	1	358.70			
09.284	1	358.43			
09.346	5	358.29			R_{31}5
09.429	10	358.09			S_{31} 1
09.497	10b	357.93		S_{21} 5	R_3 5
09.666	3	357.53			
09.808	1	357.20			
09.894	10	356.99			R_{32}4
09.977	10	356.80		R_2 9	
10.069	6	356.58			Q_3 15
10.156	5	356.38	R_1 12		
10.367	4	355.88			R_{31}4
10.476	10	355.62		R_{21}9	
10.559	10	355.43			R_3 4
10.643	2	355.23			
10.727	10b	355.03			R_{32}3
11.009	2	354.37			
11.195	8	353.93			R_{31}3
11.289	1	353.70			
11.368	10	353.52		[R_{32}2	Q_3 14
11.446	10	353.34			R_3 3
11.785	3d	352.54			R_{31}2
11.947	3	352.15			Q_{32}13
12.046	2	351.92			
12.125	9	351.71		R_2 8	
12.182	9	351.60			R_3 2
12.368	2	351.16			
12.486	10	350.88		S_{21} 4	
12.544	10	350.75			Q_3 13
12.625	10	350.56		R_{21}8	
12.721	1	350.33			
12.844	2	350.04			

λ	I	ν	Classification 7-4		
6512.933	4	15 349.71			$Q_{32}12$
13.062	10	349.53	R_1 11		
13.131	4	349.37			
13.255	1d	349.07			
13.475	1d	348.55			
13.568	9	348.33			Q_3 12
13.750	1	347.91			
13.842	5	347.69			$Q_{32}11$
14.170	10	346.92		R_2 7	
14.364	1	346.46			
14.444	10	346.27			Q_3 11
14.515	1	346.11			
14.575	5	345.96			$Q_{32}10$
14.667	10b	345.74	[Q_2 15	$R_{21}7$	
14.790	3	345.45			
14.860	7	345.29			$Q_{32}3$
15.135	9	344.64			$Q_{32}9$
15.181	10	344.53			Q_3 10
15.294	2	344.27		$Q_{23}15$	
15.383	10b	344.06		S_{21} 3	$Q_{32}4$
15.466	1	343.86			
15.569	10b	343.62		[Q_3 3	$Q_{32}8$
15.701	10	343.31			$Q_{32}5$
15.758	10b	343.18		[Q_3 9	$Q_{32}7$
15.840	6	342.98			$Q_{32}6$
15.899	8	342.84	R_1 10		
15.969	1	342.68			
16.055	10	342.48			Q_3 4
16.102	8	342.37		R_2 6	
16.164	10	342.22			Q_3 8
16.247	4	342.02		Q_2 14	
16.339	10	341.81			Q_3 5
16.402	10	341.66			Q_3 7
16.469	10	341.50			Q_3 6
16.532	1	341.35			
16.588	10	341.22		$R_{21}6$	
16.739	0	340.87		$Q_{21}14$	
16.844	1	340.62		$Q_{23}14$	
17.033	3	340.17			
17.253	4	339.66			
17.430	1	339.24			
17.503	1	339.07			
17.568	3	338.91			
17.709	10	338.58		Q_2 13	
17.851	1	338.25			
17.933	10	338.06		R_2 5	
18.048	5	337.79	Q_1 17		
18.166	10	337.51		S_{21} 2	
18.226	3	337.37		$Q_{21}13$	
18.318	4	337.15		$Q_{23}13$	
18.414	10b	336.93		$R_{21}5$	
18.671	10	336.32	R_1 9		
18.877	1	335.83			
18.970	2	335.62			
19.055	8	335.42		Q_2 12	

λ	I	ν	Classification 7-4		
6519.174	5	15 335.13			
19.261	1	334.93			
19.361	1	334.70			
19.444	1	334.50			
19.570	2	334.20		$Q_{21}12$	
19.656	9	334.00		R_2 4	$Q_{23}12$]
19.733	1	333.82			
19.968	1	333.27			
20.048	2	333.08			
20.130	10	332.89	Q_1 16	$R_{21}4$	
20.199	4	332.73			P_3 4
20.295	10	332.50		Q_2 11	
20.649	1bd	331.67			
20.757	1	331.41			
20.829	10	331.24		$Q_{21}11$	S_{21} 1]
20.903	7	331.07		$Q_{23}11$	
20.988	3	330.87			
21.284	10	330.17		R_2 3	
21.375	10	329.96	R_1 8		
21.434	10	329.82		Q_2 10	
21.565	2	329.51			
21.658	5	329.29	$Q_{12}15$		
21.737	10b	329.11		$R_{21}3$	
21.860	9	328.82			P_3 5
21.931	6	328.65		$Q_{21}10$	
22.028	6	328.43		$Q_{23}10$	
22.159	9	328.12	Q_1 15		
22.360	1	327.64			
22.444	10	327.45		Q_2 9	
22.638	2	326.99			
22.8.0	5	326.59		R_2 2	
22.949	10	326.26		$Q_{21}9$	
23.057	10	326.01		$Q_{23}9$	
23.156	1	325.77			
23.242	10	325.57			
23.349	10	325.32	[S_{21} 0	Q_2 8	P_3 6
23.512	1	324.94			
23.609	5	324.71	$Q_{12}14$		
23.691	1	324.52			
23.858	9	324.13		$Q_{21}8$	
23.962	9	323.88		$Q_{23}8$	
24.030	10	323.72	R_1 7		
24.091	5	323.58	Q_1 14		
24.150	10	323.44		Q_2 7	
24.234	3	323.24		R_2 1	
24.422	1	322.80			
24.491	5	322.64			
24.550	3	322.50			
24.632	10b	322.31	[R_{21}1	$Q_{21}7$	P_3 7
24.766	10	321.99		$Q_{23}7$	
24.838	10	321.82		Q_2 6	
25.173	1	321.04			
25.249	3	320.86			
25.330	10	320.67		$Q_{21}6$	
25.415	10	320.47	$Q_{12}13$	Q_2 5	

λ	I	ν	Classification 7-4			λ	I	ν	Classification 7-4		
6525.475	10	15 320.33		$Q_{23}6$		6531.364	1	15 306.52			
25.615	1	320.00				31.456	2	306.30			
25.726	10	319.74			P_3 8	31.521	1	306.15			
25.810	1	319.54				31.591	2	305.99			
25.891	10	319.35	[$R_{21}0$	$Q_{21}5$	Q_2 4]	31.669	10b	305.81	R_1 4	$P_{23}4$	
25.956	10	319.20	Q_1 13			31.798	9	305.51		P_2 5	
26.067	10	318.94		$Q_{23}5$		31.992	1	305.05			
26.143	1	318.76				32.165	10	304.64	$Q_{12}9$		
26.276	9	318.45		Q_2 3		32.305	3	304.31			
26.374	9	318.22		$Q_{21}4$		32.445	10b	303.98		$P_{23}5$	
26.493	1	317.94				32.525	9	303.80		P_2 6	
26.565	10	317.78		$Q_{23}4$	Q_2 2]	32.583	2	303.66			
26.638	10	317.60	R_1 6		P_3 9	32.658	10b	303.49	Q_1 9		
26.735	10	317.37		$Q_{21}3$	Q_2 1]	32.996	1	302.70			
26.917	3	316.95				33.135	10b	302.37		P_2 7	$P_{21}6$]
26.993	10b	316.77		$Q_{23}3$	$Q_{21}2$]	33.224	1	302.16			
27.065	1	316.60				33.311	10	301.96		$Q_{23}3$	
27.138	7	316.43		$Q_{21}1$		33.380	1	301.80			
27.222	3	316.23	$Q_{12}12$			33.443	2	301.65			
27.295	1	316.05				33.534	1	301.44			
27.378	10b	315.87		$Q_{23}2$	P_3 10	33.616	9	301.24		P_2 8	
27.515	1	315.54				33.678	9	301.09	$Q_{12}8$		
27.637	3	315.25				33.745	10b	300.94		$P_{23}7$	
27.734	9	315.03	Q_1 12			33.819	2	300.77			
27.852	10b	314.75		$Q_{23}1$		33.928	1	300.50			
27.918	1	314.60				34.013	10	300.31		P_2 9	
27.978	10	314.45			P_3 11	34.125	10	300.05	R_1 3		
28.243	1	313.83				34.179	10	299.92	Q_1 8		
28.355	3	313.57				34.234	10	299.80		$P_{23}8$	
28.411	7	313.44			P_3 12	34.296	8	299.65		P_2 10	
28.559	1	313.10				34.389	1	299.43			
28.641	1	312.90				34.463	10	299.26		P_2 11	P_2 13]
28.689	9	312.78			P_3 13	34.533	5	299.10		P_2 12	
28.807	9	312.52			P_3 14	34.627	10b	298.88		$P_{23}9$	
28.877	1	312.34				34.697	1	298.71			
28.937	8	312.21	$Q_{12}11$			34.828	1	298.41			
29.014	1	312.03				34.908	10	298.22		$P_{23}10$	
29.089	2	311.85		P_2 2		34.993	2	298.02			
29.167	10b	311.67	R_1 5			35.067	10	297.84		$P_{23}11$	
29.244	1	311.48				35.143	10	297.67	$Q_{12}7$		
29.358	3	311.22				35.345	1	297.26			
29.443	10	311.02	Q_1 11			35.427	10	297.00		$Q_{23}4$	
29.719	1	310.37				35.491	2	296.85			
29.822	1	310.13				35.560	4	296.69			
29.899	10	309.95		$P_{23}2$		35.638	10b	296.51	Q_1 7		
30.097	2	309.49		P_2 3		35.814	1	296.10			
30.491	1	308.56				36.178	1	295.25			
30.584	7	308.35	$Q_{12}10$			36.320	2	294.91			
30.662	2	308.16				36.466	1	294.57			
30.725	2	308.02				36.556	10	294.36	$Q_{12}6$	R_1 2]	
30.801	10b	307.84		$P_{23}3$		36.789	1	293.82			
30.868	1	307.68				36.913	1	293.52			
30.994	4	307.39		P_2 4		36.984	2	293.36			
31.087	10	307.16	Q_1 10			37.052	10b	293.20	Q_1 6		
31.231	2	306.83				37.249	1bd	292.74			

λ	I	ν	Classification 7-4		
6537.381	1	15 292.43			
37.461	10b	.292.24		$O_{23}5$	
37.534	2	292.07			
37.652	1	291.33			
37.931	10	291.14	$Q_{12}5$		
38.008	1	290.96			
38.206	1	290.50			
38.273	2	290.35			
38.333	5	290.20			
38.415	10b	290.01	Q_1 5		
38.857	2	288.98	$P_{12}17$		
38.920	10	288.81	R_1 1		
39.186	1	288.21			
39.266	10	288.02	$Q_{12}4$		
39.335	1	287.86			
39.415	10	287.67		$O_{23}6$	
39.588	1	287.27			
39.659	2	287.10			
39.736	10b	286.92	Q_1 4	$P_{12}16$]	
40.226	3	285.78	P_1 16		
40.477	6	285.19	$P_{12}15$		
40.564	10	284.99	$Q_{12}3$		
40.878	1	284.26			
40.938	3	284.12			
41.017	10d	283.93	Q_1 3	P_1 15]	
41.150	3	283.62	$P_{12}14$		
41.260	10b	2[illegible].36	R_1 0	$O_{23}7$	
41.549	1	282.69			
41.662	7	282.42	P_1 14		
41.747	8	282.23	$P_{12}13$		
41.828	10	282.04	$Q_{12}2$		
41.936	1	281.78			
42.184	2	281.21			
42.268	10b	281.01	Q_1 2	P_1 13]	$P_{12}12$]
42.591	1	280.26			
42.722	10	279.95	P_1 11		
42.790	9	279.81	P_1 12		
42.883	1	279.57	$P_{13}12$		
43.021	10	279.25		$O_{23}8$	
43.073	10	279.14	$Q_{12}1$		
43.115	10	279.04	$P_{12}10$		
43.237	10	278.74	P_1 11		
43.301	1	278.59			
43.367	2	278.44	$P_{13}11$		
43.454	10b	278.24	$P_{12}9$	Q_1 1]	
43.536	1	278.05			
43.618	10	277.85	P_1 10		
43.705	10	277.65	$P_{12}8$	$P_{13}10$]	
43.762	2	277.47			
43.848	[illegible]	277.32			
43.929	10b	277.12	P_1 9	$P_{12}7$]	
44.006	3	276.91			
44.095	10	276.73	$P_{12}6$	$P_{13}9$]	
44.222	10b	276.44	P_1 8	$P_{12}5$]	
44.333	10	276.16	$P_{12}4$	$P_{13}8$]	
6544.410	10	15 275.99	P_1 7	$P_{12}3$]	
44.487	10	275.82	$P_{12}2$	$P_{12}1$]	
44.585	10	275.59	P_1 6	Q_1 0]	$P_{13}7$]
44.664	10	275.42		$O_{23}9$	
44.714	10	275.30	P_1 5	$P_{11}6$]	
44.804	10	275.08	P_1 4	P_1 0]	
44.879	10b	274.91	P_1 1-3		
44.998	2	274.64	$P_{13}4$		
45.116	4	274.36	$P_{13}3$		
45.302	1	273.92	$P_{12}2$		
45.624	1d	273.17			
46.061	1d	272.15			
46.209	10	271.81		$O_{23}10$	
46.506	1	271.11			
46.577	1	270.95			
46.657	10	270.76	$O_{12}1$		
46.851	1	270.31			
47.144	1	269.63			$T_{21}10$
47.348	1d	269.15			
47.637	10	268.48		$O_{23}11$	
47.726	1	268.27			
47.814	10	268.06	$O_{12}2$		
48.044	1	267.53			
48.530	2	266.39			
48.632	6	266.16	$O_{13}2$		
48.716	2	265.96			$S_{12}14$
48.799	1	265.77			
48.852	7	265.64	$N_{13}2$		
48.952	10	265.41	$O_{12}3$	$O_{23}12$	
49.019	2	265.25			
49.216	2	264.80			
49.459	1	264.23			
49.577	1	263.96			
49.670	10	263.74	$O_{13}3$		
49.976	3	263.03		$S_{21}15$	
50.059	10	262.83	$O_{12}4$		
50.157	7	262.60		$O_{23}13$	
50.654	1	261.[illegible]5			
50.741	10	261.24	$O_{13}4$		
50.831	1	261.02			
50.916	1	260.83			
51.003	1	260.63			
51.084	10	260.44	$N_{13}3$		
51.148	10b	260.29	$O_{12}5$		
51.245	2	260.07		$O_{23}14$	
51.414	1	259.67			
51.667	1	259.09			
51.797	10	258.78	$O_{13}5$		$T_{31}9$
51.956	1	258.41			
52.035	1	258.23			
52.121	1	258.03			
52.200	10b	257.84	$O_{12}6$	$O_{23}15$	
52.397	1	257.39			
52.519	3	257.10			$S_{12}13$
52.738	1	256.59			

λ	I	ν	Classification 7-4		6-3	
6552.837	10	15 256.36	$O_{13}6$			
53.008	2	255.96				
53.076	1	255.81				$S_{31}13$
53.134	2	255.67				
53.212	10h	255.49	$O_{12}7$			
53.287	1	255.31				
53.374	10	255.11	$N_{13}4$			
54.843	10	254.02	$O_{13}7$			
54.034	1	253.57				
54.189	10	253 21	$O_{12}8$			
54.423	1	252.67				
54.630	1d	252.19				
54.814	8	251.76	$O_{13}8$			
54.885	1	251.59				
55.029	1	251.26				
55.120	10	251.05	$O_{12}9$			
55.222	1	250 [illegible]1				$R_{3}19$
55.312	1	[illegible].0				
55.568	1	[illegible]01				
55.659	10	[illegible]9.79	$N_{13}5$			
55.736	6	249.61	$O_{13}9$			
55.904	2	249.22				
55.997	10	249.01	$O_{12}10$			
56.225	4	248.48			[$T_{31}8$	$S_{32}12$
56.611	3	247.58	$O_{13}10$			
56.671	1	247.44				
56.746	1	247.27				$S_{31}12$
56.819	10	247.09	$O_{12}11$			
57.0[illegible]5	2d	246.62				
57.430	5	245.67	$O_{13}11$			
57.582	8	245.32	$O_{12}12$			
57.789	1	244.84				
57.929	9	244.51	$N_{13}6$			
58.184	1	243.92	$O_{13}12$			
58.277	10	243.71	$O_{12}13$		$S_{21}13$	
58.390	1	243.44				$R_{3}18$
58.893	5	242.28	$O_{12}14$	$O_{13}13$]		
59.219	2	241.52			$R_{2}19$	
59.448	5	240.98	$O_{12}15$			
59.513	2	240.83	$O_{13}14$			
59.620	1	240.58				
59.723	1	240.35			$R_{21}19$	
59.794	9	240.18				$S_{32}11$
59.923	1	239.88	$O_{12}16$			
60.054	1	239.58	$O_{13}15$			
60.173	10	239.30	$N_{13}7$			
60.304	3	239.00	$O_{12}17$			$S_{31}11$
60.382	1	238.82				
60.467	1	238.52				
60.548	7	238.43				$T_{31}7$
60.6[illegible]	1	238.12				
60.767	2	237.92				
60.839	2	237.75				$R_{32}17$
61.255	1	236.79				
61.442	4	236.35				$R_{3}17$

λ	I	ν	Classification 7-4	6-3		
6561.631	1	15 235.91				
61.894	2	235.30				
62.011	1	235.03				
62.130	1	234.76				
62.241	4	234.50			$S_{21}12$	
62.313	1	234.33				
62.394	7	234.14	$N_{13}8$			
62.565	2	233.75			$R_{2}18$	
62.716	10	233.39*				
62.868	10	233.04*				
63.080	1	232.55			$R_{21}18$	
63.217	8	232.23				$S_{32}10$
63.745	2	231.01				$S_{31}10$
64.370	3	229.56				$R_{3}16$
64.446	3	229.38		$R_{1}19$		
64.498	1	229.26				
64.571	9	229.09	$N_{13}9$			
64.714	7	228.76				$T_{31}6$
64.991	1	228.12				
65.138	1	227.78				
65.559	1	226.80				
65.663	1	226.56				
65.785	3	226.27			$R_{2}17$	
65.939	1	225.92				
66.114	9	225.51			$S_{21}11$	
66.306	2	225.07			$R_{21}17$	
66.425	1	224.79				
66.508	10	224.60			[$S_{32}9$	$R_{32}15$
66.566	2	224.46				
66.707	4	224.14	$N_{13}10$			
66.878	4	223.74				
67.023	6	223.40				$S_{31}9$
67.163	7	223.08				$R_{3}15$
67.432	3	222.46				
68.025	2	221.08		$R_{1}18$		
68.413	1	220.18				
68.724	10	219.46				$T_{32}5$
68.799	4	219.29	$N_{13}11$			
68.906	2	219.04			$R_{2}16$	
69.217	3	218.32				$R_{32}14$
69.289	1	218.15				
69.351	2	218.01				
69.430	1	217.83			$R_{21}16$	
69.548	1	217.55				
69.647	10	217.32				$S_{32}8$
69.831	6	216.90				$R_{3}14$
69.877	7	216.79			$S_{21}10$	
70.011	1	216.48				
70.097	1	216.28				
70.156	1	216.15				$S_{31}8$
70.262	2	215.90				
70.619	2	214.61				
70.692	2	214.44				
71.410	1	213.24				
71.510	5	213.01		$R_{1}17$		

$*H_{\alpha}$

λ	I	ν	Classification 6-3			λ	I	ν	Classification 6-3		
6571.567	1	15 212.88				6579.119	10	15 195.41			R_3 10
71.750	8	212.45			R_{32}13	79.212	2	195.20			Q_3 20
71.907	6	212.09		R_2 15		79.462	2	194.62			
72.128	1	211.58				79.653	10	194.18			T_{32}2
72.271	1	211.25			R_{31}13	79.743	1	193.97			
72.365	10	211.03			R_3 13	79.858	1	193.71			
72.432	4	210.87		R_{21}15		80.270	9	192.76		R_2 12	
72.496	1	210.73				80.369	2	192.53			
72.550	10	210.60			T_{31}4	80.447	10	192.35			R_{32}9
72.624	10	210.43			S_{32}7	80.512	10	192.20		S_{22} 7	
72.795	2	210.04	N_{13}13			80.548	10b	192.12			S_{32}4
72.981	2	209.61				80.784	8	191.57		R_{21}12	
73.063	1	209.42				80.883	2	191.34			
73.131	10	209.26			S_{31} 7	80.966	4	191.15			R_{31}9
73.371	1	208.70				81.030	10	191.00			S_{31}4
73.529	10	208.34		S_{21} 9		81.076	10b	190.90			R_3 9
73.694	1	207.96				81.205	5	190.60			Q_3 19
73.808	2	207.69				81.325	1	190.32			
74.143	7	206.92			R_{32}12	81.459	8	190.01	R_1 14		
74.398	1	206.33				81.631	1	189.62			
74.525	1	206.03				81.756	1	189.33			
74.655	1	205.73			R_{31}12	81.920	2	188.95			
74.759	9	205.49			R_3 12	82.085	1	188.57			
74.807	4	205.38		R_2 14		82.157	1	188.40			
74.914	3	205.13	R_1 16			82.241	10	188.21			R_{32}8
75.1[illegible]	2d	204.56				82.376	1	187.90			
75.333	4	204.16		R_{21}14		82.470	1	187.68			
75.438	10	203.92			S_{32}6	82.610	3	187.36			
75.603	2	203.54				82.683	3	187.19			
75.798	1d	203.09				82.748	10	187.04			R_{31}8
75.945	9	202.75			S_{31}6	82.820	10b	186.87		R_2 11	S_{32}3
76.033	1	202.55				82.881	10	186.73		[T_{31}1	R_3 0
76.128	1	202.33				83.070	6	186.30			Q_3 18
76.203	10	202.15			T_{31}3	83.140	4	186.13			
76.397	10	201.71			R_{32}11	83.217	3	185.96			
76.597	2	201.24				83.292	10	185.78			S_{31}3
76.787	1	200.80				83.343	10	185.67		R_{21}11	
76.864	1	200.63				83.438	2	185.45			
76.934	2	200.46			R_{31}11	83.542	1	185.21			
77.010	10	200.29			R_3 11	83.640	2	184.98			
77.081	10	200.12		S_{21} 8		83.722	2	184.79			
77.261	1	15 199.71				83.857	10b	184.48		S_{21} 6	R_{32}7
77.379	1	199.43				84.022	2	184.10			
77.493	1	199.17				84.212	1	183.66			Q_{32}17
77.593	10	198.94		R_2 13		84.297	1	183.47			
77.701	3	198.69				84.377	7	183.28			R_{31}7
78.002	2	197.99				84.500	10b	183.00			R_3 7
78.086	10b	197.60		R_{21}13	S_{32}5	84.612	10	182.74	R_1 13		
78.227	8	197.48	R_1 15			84.664	1	182.57			
78.336	2	197.22				84.748	1	182.43			
78.416	1	197.04				84.815	8	182.27			Q_3 17
78.499	10	196.85			R_{32}10	84.898	10b	182.08			S_{32}2
78.585	10	196.65			S_{31} 5	84.968	6	181.92			
78.781	1	196.20				85.126	2	181.55			
79.021	2	195.64			R_{31}10	86.265	10	181.23		R_2 10	

λ	I	ν	Classification 6-3		
6585.311	10	15 181.13			$R_{32}6$
85.340	6	181.06			$S_{31}2$
85.486	1	180.72			
85.592	1	180.48			
85.711	1	180.21			
85.790	10	180.02		$R_{21}10$	$R_{31}6$
85.871	10	179.84			$T_{31}0$
85.963	10	179.62			$R_3\,6$
86.239	1	178.99			
86.344	1	178.75			
86.435	8	178.54			$Q_3\,16$
86.575	10b	178.21			$R_{32}5$
86.637	1	178.07			
86.700	1	177.93			
86.765	10	177.78			$S_{32}1$
86.897	1	177.47			
86.976	5	177.29			
87.057	10b	177.10		$S_{21}5$	$R_{31}5$
87.168	10	176.85			$S_{31}1$
87.239	10b	176.68		[$Q_{32}15$	$R_3\,5$
87.436	1	176.23			
87.525	1	176.02			
87.599	10	175.85		$R_2\,9$	
87.650	10b	175.74	$R_1\,12$		$R_{32}4$
87.810	1	175.37			
87.901	10	175.16			$Q_3\,15$
87.970	1	175.00			
88.043	2	174.83			
88.121	10b	174.65		$R_{21}9$	$R_{31}4$
88.198	1	174.46			
88.266	2	174.32			
88.339	10b	174.15			$R_3\,4$
88.441	3	173.92			
88.520	10b	173.73			$R_{32}3$
88.632	0	173.47			$Q_{32}14$
88.708	2	173.30			
88.776	1	173.14			
88.856	1	172.96			
88.925	1	172.80			
88.996	10	172.64			$R_{31}3$
89.104	2	172.39			
89.181	10	172.21			$R_{32}2$
89.250	10	172.05		[$Q_3\,14$	$R_3\,3$
89.430	1	171.64			
89.528	2	171.43		$Q_{21}17$	
89.633	5	171.17			$R_{31}2$
89.751	1	170.90			
89.829	10	170.72		$R_2\,8$	$Q_{32}13$
89.922	1	170.50			
90.016	10	170.29			$R_3\,2$
90.085	1	170.13			
90.164	10	169.95		$S_{21}4$	
90.252	1	169.74			
90.340	10	169.54		$R_{21}8$	
90.436	10	169.32			$Q_3\,13$

λ	I	ν	Classification 6-7		
6590.514	1	15 169.14			
90.603	1	168.94			
90.683	10	168.75	$R_1\,11$		
90.768	1	168.56			
90.829	5	168.42		$Q_2\,16$	
90.871	3	168.32			$Q_{31}12$
91.274	1	167.39			
91.352	3	167.22		$Q_{21}16$	
91.396	6	167.11	$Q_1\,19$		
91.491	10	166.89			$Q_3\,12$
91.779	9	166.23			$Q_{32}11$
91.860	1	166.04			
91.937	10	165.87		$R_2\,7$	
92.187	2	165.29			
92.255	1	165.14			
92.314	3	165.00			
92.397	10	164.81			$Q_3\,11$
92.447	10	164.69		$R_{21}7$	
92.522	9	164.52			$Q_{32}10$
92.562	9	164.43		$Q_2\,15$	
92.703	1	164.11			
92.815	10	163.85			$Q_{32}3$
92.904	2	163.64			
93.015	2	163.39			
93.090	10	163.22			
93.108	4	163.17		$Q_{21}15$	$Q_{32}9$
93.155	10	163.07		$S_{21}3$	$Q_3\,10$
93.255	2	162.84			
93.293	1	162.75			
93.360	10	162.59			$Q_{32}4$
93.458	2	162.37			
93.541	10	162.18		[$Q_{32}8$	$Q_3\,3$
93.609	10	162.02	$R_1\,10$		
93.690	10	161.84			$Q_{31}5$
93.742	10	161.72		[$Q_2\,9$	$Q_{32}7$
93.829	10	161.52			$Q_{32}6$
93.929	10	161.29		$R_2\,6$	
93.988	2	161.15			
94.047	10	161.01			$Q_3\,4$
94.164	10b	160.75		$Q_2\,14$	$Q_3\,8$
94.257	5	160.51			
94.355	10	160.31			$Q_3\,5$
94.415	10	160.17		$R_{21}6$	$Q_3\,7$
94.474	10	160.03			$Q_3\,6$
94.607	2	159.73			
94.693	3	159.53		$Q_{21}14$	
94.787	3	159.31		$Q_{21}14$	
95.020	1	158.78			
95.241	2	158.27			
95.335	1	158.05			
95.449	2	157.79	$Q_{11}17$		
95.536	1	157.59			
95.604	1	157.44			
95.679	10	157.26		$Q_2\,13$	
95.755	2	157.09			

λ	I	ν	Classification 6-3			λ	I	ν	Classification 6-3		
6595.822	10	15 156.93		R_2 5		6601.374	2	15 144.19			
95.889	2	156.78				01.422	10	144.08		S_{21} 0	
95.969	8	156.60	Q_1 17			01.466	10	143.98		Q_2 8	
96.049	10	156.41		S_{21} 2		01.540	1	143.81			
96.118	2	156.25				01.606	10	143.65	Q_{12}14		P_3 6
96.201	2	156.06		Q_{21}13		01.775	1	143.27			
96.314	10b	155.80		R_{21}5	Q_{23}13]	01.851	1	143.09			
96.401	2	155.60				01.909	4	142.96			
96.463	10	155.46	R_1 9			01.994	10	142.76	R_1 7	Q_{21}8	
96.660	1	155.01				02.100	10	142.52		Q_{23}8	
96.760	2	154.78				02.178	9	142.34	Q_1 14		
96.914	1	154.43				02.285	10b	142.10		Q_2 7	
96.988	1	154.26				02.340	9	141.97		R_2 1	
97.064	10	154.08		Q_2 12		02.434	2	141.76			
97.453	1	153.19				02.527	1	141.54			
97.602	10	152.84		R_2 4	Q_{21}12]	02.597	1	141.38			
97.685	6	152.65		Q_{23}12		02.663	2	141.23			
97.837	1	152.31				02.747	10	141.04		R_{21}1	
97.941	1	152.07				02.797	10	140.92		Q_{21}7	
98.015	3	151.90				02.930	10	140.62		Q_{23}7	P_3 7
98.097	10b	151.71	Q_1 16	R_{21}4		02.985	10	140.49		Q_2 6	
98.183	1	151.51				03.074	1	140.29			
98.259	2	151.34				03.346	3	139.66			
98.337	10b	151.15		Q_2 11	P_3 4	03.429	2	139.47			
98.484	1	150.82				03.501	10	[illegible]9.31	Q_{12}13	Q_{21}6	
98.591	1	150.57				03.588	10	139.11		Q_2 5	
98.671	2	150.39				03.645	10	138.98		Q_{23}6	
98.739	4	150.25				03.850	2	138.51			
98.791	10	150.12		S_{21} 1		03.936	2	138.31			
98.653	10	149.97		Q_{21}11		03.999	7	138.17			
98.955	10	149.74		Q_{23}11		04.082	10	137.98	[Q_{21}5	Q_2 4	P_3 8
99.065	1	149.49				04.170	2	137.78		R_{21}0	
99.140	2	149.31				04.258	10b	137.57		Q_{23}5	
99.265	10b	149.03	R_1 8	R_2 3		04.350	2	137.29			
99.348	1	148.84				04.467	10	137.09		Q_2 3	
99.416	2	148.68				04.570	10	136.86		Q_{21}4	
99.492	10	148.50		Q_2 10		04.675	10	136.62	R_1 6		
99.602	2	148.25				04.772	10	136.40		Q_{23}4	Q_3 2]
99.671	9	148.09	Q_{12}15			04.857	2	136.20			
99.753	10b	147.91		R_{21}3		04.939	10	136.01		Q_{21}3	Q_3 1]
99.911	3	147.54				05.046	10	135.77			P_3 9
6600.006	9	147.33		Q_{21}10		05.118	4	135.60			
00.075	10	147.17			P_3 5	05.202	10b	135.41		Q_{21}2	Q_{23}3]
00.128	9	147.05		Q_{23}10		05.269	2	135.26			
00.187	10	146.91	Q_1 15			05.349	10	135.07		Q_{21}1	
00.382	1	146.46				05.434	1	134.88			
00.457	3	146.29				05.510	[illegible]	134.70			
00.537	10b	146.11		Q_2 9		05.588	10b	134.53		Q_{23}2	
00.724	1	145.68				05.663	1	134.35			
00.863	8	145.36		R_2 2		05.753	2	134.15			
00.968	1	145.12				05.833	10	133.96			P_3 10
01.059	10	144.91		Q_{21}9		05.909	10	133.79	Q_1 12		
01.170	10	144.66		Q_{23}9		05.998	4	133.59			
01.233	2	144.51				06.085	10b	133.39		Q_{23}1	
01.311	10	144.33		R_{21}2		06.180	1	133.17			

λ	I	ν	Classification 6-3		
6606.283	2	15 132.93			
06.367	1	132.74			
06.447	10	132.56			P_3 11
06.594	2	132.22			
06.820	1	131.70			
06.905	10	131.51			P_3 12
06.981	1	131.33			
07.046	2	131.19			
07.132	10	130.99	Q_{12}11		
07.201	10	130.83			
07.301	10b	130.60	R_1 5		P_3 14
07.498	3	130.15			
07.576	2	129.97			
07.661	10b	129.78	Q_1 11		
07.727	2	129.63			
07.835	2	129.38			
07.920	2	129.18			
07.975	2	129.06			
08.058	2	128.87			
08.130	3	128.70			
08.211	10b	128.52		P_{23}2	
08.281	1	128.36			
08.410	5	128.06		P_2 3	
08.484	4	127.89			
08.756	1	127.27			
08.825	10	127.11	Q_{12}10		
08.905	1	126.93			
08.957	1	126.81			
09.002	4	126.71			
09.066	6	126.56			
09.152	10b	126.36		P_{23}3	
09.254	2	126.13			
09.346	10b	125.92	Q_1 10	P_2 4	
09.475	4	125.62			
09.543	1	125.47			
09.676	1	175.16			
09.744	1	125.01			
09.810	2	124.86			
09.888	10b	124.68	R_1 4		
09.967	2	124.50			
10.050	10b	124.31		P_{23}4	
10.116	2	124.16			
10.203	10	123.96		P_2 5	
10.336	4	123.65			
10.442	10	123.41	Q_{12}9		
10.524	1	123.23			
10.626	2	122.99			
10.671	1	122.89			
10.723	4	122.77			
10.789	8	122.62			
10.875	10b	122.42		P_{23}5	
10.954	10	122.22	Q_1 9	P_2 6	
11.060	2	122.00			
11.144	1	121.81			
11.255	2	121.55			
6611.353	3	15 121.33			
11.453	2	121.10			
11.515	7	120.96			
11.604	10b	120.76		P_2 7	P_{23}6}
11.686	2	120.57			
11.757	10b	120.40		O_{23}3	
11.820	3	120.26			
11.908	1	120.06			
12.008	10	119.83	Q_{12}8		
12.064	2	119.70			
12.126	10	119.56		P_2 8	
12.235	10	119.31		P_{23}7	
12.343	3	119.06			
12.428	10	118.87	R_1 3		
12.526	10b	118.65	Q_1 8	P_2 9	
12.620	8	118.43		P_{13}12	
12.757	10b	118.12		P_{23}8	
12.845	9	117.92		P_2 10	
12.906	6	117.78		P_{23}11	
12.973	1	117.62			
13.043	10	117.46		P_2 11	P_{23}10}
13.111	2	117.31		P_2 12	
13.172	10b	117.17		P_{23}9	
13.237	9	117.02			
13.311	1	116.85			
13.373	2	116.71			
13.466	10	116.50		P_{23}10	
13.510	10	116.40	Q_{12}7		
13.592	2	116.21			
13.665	10	116.04		P_{23}11	
13.733	10	115.89		P_{23}12	
13.803	5	115.73			
13.870	6	115.57			
13.956	10	115.38		O_{23}4	
14.025	10b	115.22	Q_1 7		
14.202	1	114.82			
14.354	1	114.47			
14.491	2	114.15			
14.623	2	113.85			
14.705	1	113.67			
14.766	4	113.53			
14.849	2	113.34			
14.939	10b	113.13	R_1 2		
14.966	9	113.07	Q_{12}6		
15.144	3	112.66			
15.209	1	112.51			
15.276	1	112.36			
15.320	3	112.26			
15.392	8	112.10			
15.474	10b	111.91	Q_1 6		
15.602	4	111.62	P_{12}19		
15.734	1	111.32			
15.862	3	111.02			
15.936	2	110.85			
15.994	3	110.72			

λ	I	ν	Classification 6-3		
6616.078	10b	15 110.53		$O_{23}5$	
16.139	7	110.39	P_1 19		
16.225	2	110.19			
16.293	4	110.04			
16.378	10b	109.84	$Q_{12}5$		
16.445	3	109.69			
16.530	3	109.50			
16.634	5	109.26	$P_{12}18$		
16.718	6	109.07			
16.802	10	108.88			
16.880	10b	108.70	Q_1 5		
17.056	2	108.30			
17.166	6	108.04	P_1 18		
17.242	1	107.87			
17.310	3	107.72			
17.394	10b	107.52	R_1 1		
17.463	1	107.37			
17.578	6	107.10	$P_{12}17$		
17.649	3	106.94			
17.750	10	106.71	$Q_{12}4$		
17.818	2	106.56			
17.886	1	106.40			
17.952	4	106.25			
18.017	2	106.10			
18.108	10	105.90	P_1 17	$O_{23}6$	
18.168	2	105.76			
18.242	10b	105.59	Q_1 4		
18.300	7	105.46			
18.423	5	105.18	$P_{12}16$		
18.712	1	104.52			
18.875	2	104.14			
18.953	7	103.95	P_1 16		
19.088	10b	103.66	$Q_{13}3$		
19.196	8	103.41	$P_{12}15$		
19.328	5	103.11			
19.415	4	102.91			
19.494	2	102.73			
19.564	10bn	102.57	Q_1 3		
19.650	1	102.38			
19.715	10	102.23	P_1 15		
19.782	10	102.07	R_1 0		
19.877	8	101.86	$P_{12}14$		
19.952	4	101.69			
20.040	10b	101.49		$O_{23}7$	
20.103	2	101.34			
20.164	1	101.20			
20.246	2	101.02			
20.312	2	100.87			
20.392	10	100.68	$Q_{13}2$	P_1 14]	
20.474	10	100.50	$P_{12}13$		
20.616	2	100.37			
20.696	2	099.99			
20.763	4	099.84			
20.847	10b	099.64	Q_1 2		
20.900	4	099.52			

λ	I	ν	Classification 6-3		
6620.934	7	15 099.45			
20.997	10	099.30	P_1 13	$P_{12}12$]	
21.077	3	099.12	$P_{13}13$		
21.177	2	098.89			
21.238	1	098.75			
21.288	2	098.64			
21.363	3	098.47			
21.444	10	098.28	$P_{12}11$		
21.525	10	098.10	P_1 12		
21.606	2	097.91	$P_{13}12$		
21.678	10	097.75	$Q_{12}1$		
21.755	1	097.57			
21.811	10	097.47			
21.833	10	097.40	$P_{12}10$		
21.875	10	097.30		$O_{23}8$	
21.973	10	097.08	P_1 11		
22.028	2	096.95			
22.082	10	096.83	Q_1 1	$P_{13}11$]	
22.147	10	096.68	$P_{12}9$		
22.264	3	096.41			
22.352	10	096.21	P_1 10		
22.413	10	096.07	$P_{12}8$		
22.482	5	095.92	$P_{13}10$		
22.533	9	095.80	*		
22.621	10	095.60	$P_{12}7$		
22.675	10	095.48	P_1 9		
22.730	2	095.35			
22.794	10	095.21	$P_{13}9$	$P_{12}6$]	
22.853	2	095.07			
22.922	10b	094.91	P_1 8	$P_{12}5$]	
23.014	10	094.71	$P_{12}4$		
23.086	10	094.54	$P_{12}3$	$P_{12}2$]	
23.149	10	094.40	P_1 7	$P_{12}1$]	
23.243	10	094.18	Q_1 0	$P_{13}7$]	
23.300	10	094.05	P_1 6		
23.369	2	093.89			
23.420	10	093.78	P_1 5	$P_{13}6$]	
23.495	10	093.61	P_1 4	P_1 0]	
23.573	10b	093.43	$P_1$1,2,3	$O_{23}9$	$P_{13}5$
23.701	6	093.14	$P_{13}4$		
23.814	8	092.88	$P_{13}3$		
23.856	2	092.79	$P_{13}2$		
23.963	2	092.54			
24.030	2	092.39			
24.128	1	092.17			
24.212	1	091.97			
24.303	3	091.77			
24.369	2	091.62			
24.433	1	091.47			
24.516	1	091.28			
24.642	1	090.99			
24.747	2	090.76			
24.831	1	090.56			
24.902	2	090.40			
25.030	1	090.11			

*N I line 6652.53

λ	I	ν	Classification 6-3		5-2
6625.115	1	15 089.92			
25.197	10	089.73		$O_{23}10$	
25.260	1	089.59			
25.315	2	089.46			
25.397	10b	089.27	$O_{12}1$		
25.566	1	088.89			
25.668	1	088.66			
25.778	1	088.41			
25.899	2	088.13			$T_{31}10$
25.986	1	087.93			
26.183	1	087.48			
26.256	2	087.32			
26.345	1	087.12			
26.458	5	086.86			
26.514	2	086.73			
26.598	10	086.54	$O_{12}2$		
26.693	10	086.32		$O_{23}11$	
26.858	1	085.95			
26.952	1	085.73			
27.099	1	085.40			
27.232	1	085.10			
27.314	1	084.91			
27.434	9	084.64	$O_{13}2$		
27.500	2	084.49			
27.562	1	084.35			
27.628	2	084.20			
27.689	10	084.06	$N_{13}2$		
27.783	10b	083.84	$O_{12}3$		
27.902	1	083.57			
28.073	10	083.18		$O_{23}12$	
28.163	1	082.98			
28.370	3	082.51			
28.435	1	082.36			
28.519	10	082.17	$O_{13}3$		
28.645	2	081.68			
28.732	2	081.68			
28.787	3	081.56			
28.853	4	081.41			
28.942	10b	081.21	$O_{12}4$		
29.095	1	080.86			
29.185	1	080.65			
29.262	1	080.48			
29.342	10	080.30		$O_{23}13$	
29.555	1	079.81			
29.638	10	079.62	$O_{13}4$		
29.724	1	079.43			
29.827	3	079.19			
29.920	5	078.98			
30.009	10	078.78	$N_{13}3$		
30.072	10b	078.63	$O_{12}5$		
30.244	1	078.24			
30.391	1	077.91			
30.492	8	077.68		$C_{23}14$	
30.604	3	077.43			
30.671	2	077.27			$T_{31}9$

λ	I	ν	Classification 6-3		5-2	
6630.747	10b	15 077.10	$O_{13}5$			
30.814	1	076.95				
30.969	6	076.59				
31.053	3	076.40				
31.171	10b	076.14	$O_{12}6$			
31.237	3	075.99				
31.380	2	075.66				
31.513	9	075.36		$O_{23}15$		$S_{32}13$
31.585	3	075.19				
31.695	2	074.94				
31.758	1	074.80				
31.830	10	074.64	$O_{13}6$			
31.952	5	074.36				
32.024	3	074.20				$S_{31}12$
32.086	3	074.05				
32.136	2	073.94				
32.241	10b	073.70	$O_{12}7$			
32.374	10	073.40	$N_{13}4$			
32.428	3	073.28		$O_{23}16$		
32.530	1	073.05				
32.677	4	072.71				
32.797	1	072.44				
32.887	10	072.23	$O_{13}7$			
32.975	1	072.03				
33.057	4	071.85				
33.115	1	071.72				
33.180	2	071.57		$O_{23}17$		
33.267	10b	071.37	$O_{12}8$			
33.334	1	071.22				
33.447	2	070.96				
33.511	4	070.82				
33.651	1	070.50				
33.705	3	070.38				
33.783	1	070.20				
33.906	10	069.92	$O_{13}8$			
34.013	2	069.66				
34.096	2	069.49				
34.157	3	069.35				
34.247	10b	069.15	$O_{12}9$			
34.383	5	068.84				$R_4 13$
34.493	2	068.59				
34.600	1	068.35				
34.673	2	068.18				
34.754	10	067.99	$N_{13}5$			
34.822	3	067.84				
34.883	10	067.70	$O_{13}9$			
35.016	5	067.40				
35.064	5	067.29				
35.175	10b	067.04	$O_{12}10$			
35.238	1	066.90				
35.312	1	066.73				
35.331	6b	066.68			$T_{31}8$	$S_{26}12$
35.483	5	066.34				
35.587	2	066.10				
35.681	2	065.89				

λ	I	ν	Classification 6-3		5-2	
6635.758	1	15 065.71				
35.806	8	065.61	$O_{13}10$			
35.873	3	065.45				$S_{31}12$
35.959	2	065.26				
36.046	10b	065.06	$O_{12}11$			
36.248	1	064.60				
36.360	8	064.35				
36.556	1	063.90				
36.679	9	063.62	$O_{13}13$			
36.750	1	063.46				
36.806	1	063.34				
36.855	10	063.22	$O_{12}12$			
36.944	3	063.02				
37.036	4	062.81	*			
37.115	10	062.63	$N_{13}6$			
37.214	1	062.41				
37.339	4	062.13			$S_{21}13$	
37.183	4	061.80	$O_{13}12$			
37.595	10	061.54	$O_{12}13$			
37.656	1	061.41				R_3 18
37.710	4	061.29				
37.768	2	061.15				
37.882	1	060.89				
38.001	4	060.63				
38.128	1	060.34				
38.213	4	060.14	$O_{13}13$			
38.263	8	060.03	$O_{12}14$			
38.376	2	059.77				
38.450	2	059.61				
38.508	1	059.48				
38.567	3	059.24				
38.670	3	059.11				
38.765	4	058.89				
38.865	10	058.66	$O_{12}15$	$O_{13}14$		
38.956	1	058.46				
39.038	8	058.27				$S_{32}11$
39.233	1	057.83				
39.304	1	057.67				
39.371	5	057.52	$O_{12}16$			
39.457	10	057.32	$N_{13}7$	$O_{13}15$		
39.555	1	057.10				$S_{31}11$
39.693	2	056.78				
39.793	9	056.56	$O_{12}17$			$T_{32}7$
39.860	2	056.41				
39.933	1	056.24				
40.011	4	056.07				
40.066	1	055.94				
40.126	6	055.80	$O_{12}18$			
40.197	2	055.64				$R_{32}17$
40.307	5	055.40				
40.378	2	055.23	$O_{12}19$			
40.451	4	055.07				
40.561	5	054.82	$O_{12}20$			
40.638	1	054.64	$O_{12}21$			
40.813	6	054.25				R_3 17

*N I line 6637.00

λ	I	ν	Classification 6-3	5-2	
6640.923	1	15 054.00			
41.004	3	053.82			
41.058	3	053.69			
41.259	2	053.23			
41.345	1	053.04			
41.445	8	052.81		$S_{32}12$	
41.528	2	052.63			
41.655	7	052.34			
41.773	10	052.07	$N_{13}8$		
41.830	3	051.94			
41.916	1	051.75			
42.008	1	051.54			
42.119	1	051.29			
42.319	1	050.83			
42.418	3	050.61			
42.502	1	050.42			
42.592	8	050.21			$S_{32}10$
42.856	2	049.62			
42.919	1	049.47			
43.013	2	049.26			
43.106	2	049.05			$S_{31}10$
43.214	1	048.81			$R_{32}16$
43.323	2	048.56			
43.402	3	048.38			
43.480	1	048.20			
43.603	2	047.93			
43.686	8	047.73			
43.754	3	047.58			
43.835	3	047.40			R_3 16
43.975	1	047.08			
44.047	10	046.92	$N_{13}9$		
44.112	6	046.77			$T_{31}6$
44.259	3	046.44			
44.409	3	046.10			
44.526	5	045.83			
44.578	2	045.72			
44.743	1	045.34			
44.824	4	045.16			
44.907	1	044.97			
44.976	9	044.81	#		
45.113	4	044.51			
45.211	4	044.28			
45.404	2	043.85			
45.456	8	043.73		$S_{21}11$	
45.619	1	043.36			
45.695	5	043.19			
45.755	1	043.05			
45.832	2	042.88			
45.905	1	042.71			
45.988	10	042.52			$S_{32}9$
46.083	4	042.31			$R_{32}15$
46.201	1	042.04			
46.287	8	041.85	$N_{13}10$	R_2 17	
46.510	6	041.34			$S_{31}9$
46.584	2	041.17			$R_{31}15$

#N I line 6644.94

λ	I	ν	Classification 6-3	5-2	
6646.718	7	15 040.87			R_3 15
46.848	1	040.58			
46.980	3	040.28			
47.033	2	040.16			
47.104	1	040.00			
47.209	4	039.76			
47.288	2	039.58			
47.353	1	039.44			
47.439	2	039.24			
47.585	3	038.91			
47.703	5	038.65			
47.871	6	038.26			
47.978	6	038.02			
48.197	1	037.52			
48.261	10	037.38			
48.324	1	037.24			
48.400	1	037.07		R_2 16	
48.464	9	036.92	N_{13}11		
48.531	1	036.77			
48.622	1	036.57			
48.778	3	036.21			
48.843	3	036.07			R_{32}14
48.964	2	035.79		R_{21}16	
49.075	3	035.54			
49.141	1	035.39			
49.236	10	035.18			S_{32} 8
49.296	1	035.04			
49.341	7	034.94			R_{31}14
49.407	1	034.79		S_{21} 10	
49.468	5	034.65			R_3 14
49.513	2	034.55			
49.574	1	034.41			
49.693	1	034.14			
49.769	7	033.97			S_{31} 8
49.853	1	033.78			
49.932	1	033.60			
50.002	1	033.45			
50.057	3	033.32			
50.134	2	033.15			
50.215	5	032.96			
50.274	5	032.83			
50.394	4	032.56			
50.453	5	032.42			
50.493	5	032.33			
50.593	5	032.11	N_{13}12		
50.782	3	031.68			
50.879	8	031.46			
50.924	3	031.36			
51.029	6	031.12			
51.114	7	030.93			
51.255	2	030.61			
51.324	2	030.46			
51.385	2	030.32			
51.453	8	030.15			R_{12}13
51.531	6	029.99		R_2 15	
6651.595	5	15 029.84			
51.696	3	029.66			
51.801	4	029.38			
51.874	2	029.21			
51.988	5	028.95			R_{31}13
52.081	10	028.74		R_{32}15	R_3 13
52.168	2	028.55			
52.233	10	028.40			
52.320	10	028.21			S_{32} 7

Gap in the measurements which contains the following band. The $P_1$1 line coinciding with the main head (P_1) is listed.

λ	I	ν	band
6704.79	10b	14 910.60	5-2

The rotational structure of this band is given by Naudé.

λ	I	λ	4-1		
6726.080	5	14 863.41			T_{31}6
27.358	1	860.58		S_{21} 11	
28.038	4	859.08			S_{32} 9
28.413	2	858.24			
28.585	0	857.87			S_{31} 9
28.855	1	857.28			
30.374	3	853.92			T_{31}5
30.707	2	853.19			
31.394	4	851.67		S_{21} 10	S_{32} 8
31.947	1	850.45			S_{31} 8
33.739	2	846.50		R_2 15	R_{32}13
34.402	2	845.04			R_3 13
34.566	2	844.81			T_{31}4
34.602	6	844.60			S_{32} 7
35.134	2	843.43			S_{31} 7
35.297	4	843.07		S_{21} 9	
36.314	0	840.82			R_{32}12
36.773	0	839.81		R_2 14	
36.958	1	839.41			R_3 12
37.626	4	837.93			S_{32} 6
38..76	1	836.72			S_{31} 6
38.430	5	836.16			T_{31}3
38.708	2	835.55			R_{32}11
39.097	3	834.70		S_{21} 8	
39.360	4	834.12			R_3 11
39.774	2	833.21		R_2 13	
40.051	1	832.60			
40.246	1	832.17	R_2 15		
40.332	2	831.98		R_{21}13	
40.473	9	831.67			S_{32} 5

λ	I	ν	Classification 4-1			λ	I	ν	Classification 4-1		
6740.988	5	14 830.53		[R_{32}10	S_{31} 5	6754.304	0	14 801.30			Q_{32}12
41.616	3	829.15			R_3 10	54.605	1d	800.64			
42.145	4	827.99			T_{32}2	54.962	4	14 799.85			Q_3 12
42.624	1	826.94		R_2 12		55.059	6	799.64		R_2 7	
42.765	6	826.63		S_{21} 7		55.264	2	799.19			Q_{32}11
43.043	6	826.01			R_{32}9	55.595	9	798.47		R_{21}7	
43.124	6	825.84			S_{32} 4	55.927	8	797.74			Q_3 11
43.633	3	824.72		R_{21}12	S_{31} 4	56.065	1	797.44			Q_{32}10
43.705	6	824.56	R_1 14		R_3 9	56.314	10	796.89		S_{21} 3	Q_{32}3
44.959	5	821.80			R_{32}8	56.459	1	796.57			
45.351	3	820.94		R_2 11		56.602	4	796.26	R_1 10		
45.431	1	820.77				56.673	4	796.11			Q_{32}9
45.566	9	820.47			S_{32} 3	56.717	6	796.01			Q_3 10
45.638	9	820.31		[T_{31}1	R_3 8	56.918	3	795.57			Q_{32}4
45.900	3	819.74		R_{21}11		57.016	1	795.35			
46.072	6	819.36			S_{31} 3	57.109	8	795.15		[Q_{32}8	Q_3 3
46.194	1	819.09				57.190	4	794.97		R_2 6	
46.329	4	818.79		S_{21} 6		57.285	5	794.77			Q_{32}5
46.701	8	817.98			R_{32}7	57.348	9	794.63		[Q_3 9	Q_{32}7
47.049	2	817.21	R_1 13			57.435	2	794.44			Q_{32}6
47.251	1	816.77			R_{31}7	57.650	7	793.97			Q_3 4
47.378	8	816.49			R_3 7	57.728	7	793.80		R_{21}6	
47.810	8	815.54			S_{32} 2	57.791	7	793.66			Q_3 8
47.949	2	815.24		R_2 10		57.982	10	793.24			Q_3 5
48.261	8	814.55		[S_{31} 2	R_{32}6	58.048	10	793.10			Q_3 7
48.504	2	814.02		R_{21}10		58.120	7	792.94			Q_3 6
48.647	1	813.70				59.213	8	790.55		R_2 5	Q_2 13]
48.845	6	813.27			T_{31}0	59.404	8	790.13		S_{21} 2	
48.945	5	813.05			R_3 6	59.510	1	789.90			
49.613	10	811.58			R_{32}5	59.645	8	789.60	R_1 9		
49.766	9	811.25		S_{21} 5		59.732	10	789.41		R_{21}5	
49.822	10	811.13			S_{32} 1	59.885	1	789.08		Q_{21}13	
50.147	2	810.41			R_{31}5	60.692	3	787.31		Q_2 12	
50.250	6	810.19			S_{31} 1	61.107	3	786.40		R_2 4	
50.323	9	810.03	R_1 12		R_3 5	61.347	1	785.88		Q_{21}12	
50.441	4	809.77		R_2 9		61.624	9	785.27		R_{21}4	
50.772	7	809.04			R_{32}4	61.871	1	784.73			
50.990	6	808.56		R_{21}9		62.030	7	784.39		Q_2 11	
51.166	2	808.19			Q_3 15	62.285	1	783.83			P_3 4
51.279	2	807.93			R_{31}4	62.373	9	783.63		S_{21} 1	
51.389	1	807.69				62.609	6	783.12	R_1 8		
51.501	7	807.44			R_3 4	62.696	2	782.93		Q_{21}11	
51.708	10	806.99			R_{32}3	62.901	5	782.48		R_2 3	
51.921	1	806.52				63.254	6	781.71		Q_2 10	
52.206	2	805.90			R_{31}3	63.402	10	781.39		R_{21}3	
52.424	6	805.42			R_{32}2	63.581	1	780.99			
52.489	8	805.27			R_3 3	63.687	1	780.76			
52.577	1	805.08			Q_3 14	63.846	3	780.42	Q_1 15	Q_{21}10	
52.814	3	804.56		R_2 8		63.922	2	780.25		Q_{21}10	
53.097	6	803.94		S_{21} 4		64.149	5	779.75			P_3 5
53.192	1	803.75			Q_{32}13	64.350	9	779.31		Q_2 9	
53.297	5	803.50			R_3 2	64.596	2	778.78		R_2 2	
53.355	5	803.28		R_{21}0		64.901	5	778.11		Q_{21}9	
53.493	5	803.07	R_1 11			65.014	5	777.86		Q_{21}9	
53.848	5	802.30			Q_3 13	65.067	8	777.75		R_{21}2	

λ	I	ν	Classification 4-1		
6765.179	5	14 777.50		S_{21} 0	
65.331	7	.777.17		Q_{2} 8	
65.525	10	776.75	R_{1} 7		
65.660	1	776.45			
65.799	4	776.15			P_{3} 6
65.878	4	775.98		Q_{21}8	
65.951	3	775.82	Q_{1} 14		
66.006	4	775.70		Q_{13}8	
66.189	10	775.30		Q_{3} 7	
66.607	9	774.39		R_{11}1	
66.732	6	774.11		Q_{21}7	
66.868	7	773.81		Q_{23}7	
66.934	6	773.67		Q_{2} 6	
67.244	7	772.99			P_{3} 7
67.378	1	772.70			
67.469	4	772.50		Q_{21}6	
67.556	7	772.31		Q_{2} 5	
67.622	5	772.17		Q_{23}6	
67.828	1	771.72			
67.949	5	771.45	Q_{1} 13		
68.000	3	771.34		R_{21}0	
68.079	8	771.17		Q_{21}5	Q_{2} 4]
68.267	9	770.76		Q_{23}5	
68.375	7	770.52	R_{1} 6		
68.477	7	770.30		Q_{2} 3	P_{3} 8
68.591	5	770.05		Q_{21}4	
68.803	7	769.59		Q_{23}4	Q_{2} 2]
68.979	7	769.21		Q_{21}3	Q_{2} 1]
69.096	1	768.95			
69.255	10	768.60		Q_{21}2	Q_{23}3]
69.405	3	768.28		Q_{21}1	
69.521	7	768.03			P_{3} 9
69.656	8	767.73		Q_{23}2	
69.876	5	767.25	Q_{1} 12		
70.182	10	766.58		Q_{23}1	
70.277	1	766.38			
70.375	4	766.16			P_{3} 10
71.053	6	764.68			P_{3} 11
71.179	10	764.41	R_{1} 5	Q_{12}11]	
71.556	3	763.59			P_{3} 12
71.722	9	763.23	Q_{1} 11		
71.891	3	762.86			P_{3} 13
72.086	3	762.42		[P_{3} 15	P_{3} 14
72.480	9	761.57		P_{23}2	
72.710	0	761.07		P_{2} 3	
72.945	2	760.56	Q_{12}10		
73.254	10	759.89			
73.500	10	759.35	Q_{1} 10	P_{23}3	
73.765	1	758.77		P_{2} 4	
73.937	9	758.40	R_{1} 4		
74.482	9	757.21		P_{23}4	
74.658	7	756.83	Q_{12}9	P_{2} 5	
75.202	10	755.64	Q_{1} 9		
75.380	10	755.25		P_{23}5	
75.485	2	755.02		P_{2} 6	

λ	I	ν	Classification 4-1		
6776.189	10	14 753.49		P_{22}6	P_{2} 7]
76.296	9	753.26	Q_{12}8	O_{23}3	
76.654	10	752.48	R_{1} 3		
76.786	4	752.19		P_{2} 8	
76.870	10	752.01	Q_{1} 8	P_{23}7	
77.267	5	751.15		P_{2} 9	
77.467	8	750.71		P_{23}8	
77.616	3	750.39		P_{2} 10	
77.873	8	749.83	Q_{12}7	P_{2} 11	
77.937	9	749.69	[P_{2} 12	P_{23}9	P_{2} 13]
78.191	2	749.13			
78.285	6	748.93		P_{23}10	
78.428	10b	748.62	Q_{1} 7		
78.510	6	748.44		P_{23}11	
78.603	5	748.24		P_{23}12	P_{23}13]
78.680	6	748.07		O_{23}4	
79.333	7	746.65	R_{1} 2		
79.425	6	746.45	Q_{12}6		
79.963	10	745.28	Q_{1} 6		
80.913	9	743.21	Q_{12}5		
80.984	9	743.06		O_{23}5	
81.443	10b	742.06	Q_{1} 5		
81.604	1	741.71			
81.965	9	740.93	R_{1} 1		
82.372	7	740.04	Q_{12}4		
82.690	10	738.92	Q_{1} 4		
83.178	7	738.29		O_{23}6	
83.540	0	737.50	P_{12}16		
83.789	9	736.96	Q_{12}3		
84.127	1	736.23	P_{1} 16		
84.295	10b	735.85	Q_{1} 3	P_{12}15]	
84.433	1	735.56			
84.529	4	735.36	R_{1} 0		
84.884	3	734.58	P_{1} 15		
85.007	2	734.32	P_{12}14		
85.180	6	733.94	Q_{12}2		
85.277	10	733.73		O_{23}7	
85.440	1	733.38			
85.591	4	733.05	P_{12}13	P_{1} 14]	
85.663	10	732.90	Q_{1} 2		
86.120	4	731.90	P_{12}12		
86.179	5	731.79	P_{1} 13		
86.564	9	730.94	P_{12}11	Q_{12}1]	
86.696	5	730.67	P_{1} 12		
86.826	1	730.37			
86.979	10b	730.04	P_{12}10	Q_{1} 1]	
87.133	8	729.70	P_{1} 11		
87.258	10	729.43	P_{12}9	O_{23}8	
87.388	1	729.15			
87.506	10	728.89	P_{12}8	P_{1} 10]	
87.599	2	728.68	P_{12}10		
87.703	10	728.47	P_{12}7		
87.803	10	728.24	P_{1} 9		
87.859	10	728.13	P_{12}6		
87.968	10b	727.89	P_{12}5	P_{13}9]	

λ	I	ν	Classification 4-1			λ	I	ν	4-1	Classification 3-0	
6788.049	10	14 727.72	P_1 8	$P_{12}4$]		6805.801	5	14 689.30	$N_{13}7$		
88.109	10	727.59	$P_{12}3$	$P_{12}2$]		07.041	1	686.62			
88.161	10	727.47	$P_{12}1$	$P_{13}8$]		09.324	2	683.86	$N_{13}8$		
88.246	10	727.29	P_1 7	Q_1 0]		10.332	1	679.53			
88.395	9	726.96	P_1 6	$P_{13}7$]		10.579	1	678.99			
88.499	10	726.74	P_1 5			10.812	3	678.49	$N_{13}9$		
88.565	8	726.58	$P_1$0,4	$P_{13}6$]		11.061	1	677.95			
88.609	10	726.50	$P_1$1-3	$P_{13}5$]		12.510	1	674.84			
88.767	0	726.16	$P_{13}4$			12.778	1	674.25			$S_{32}9$
88.899	2	725.87	$P_{13}3$			13.251	1	673.24	$N_{13}10$		
89.026	0	725.59	$P_{13}2$			14.586	1	670.36			
89.143	9	725.34		$O_{23}9$		15.191	1	669.06			$T_{32}5$
90.552	10	722.29	$O_{12}1$			15.647	1	668.08			
90.904	4	721.52		$O_{23}10$		16.268	0	666.74			$S_{32}8$
91.852	9	719.47	$O_{12}2$	$O_{13}1$]		16.821	0	665.55			$S_{31}8$
92.540	6	717.98		$O_{23}11$		17.968	1	663.08			
92.738	2	717.55	$O_{13}2$			18.742	1	661.42			
93.021	2	716.94	$N_{13}2$			19.408	1	659.99			$T_{31}4$
93.135	10	716.69	$O_{12}3$			19.487	1	659.82			
93.923	6	714.98	$O_{13}3$			19.587	3	659.60			$S_{32}7$
94.056	2	714.69		$O_{23}12$		20.158	1	658.38		-$S_{21}9$	$S_{31}7$
94.397	10	713.95	$O_{12}4$			22.718	2	652.88			$S_{32}6$
94.766	1	713.16				23.256	1	651.72			$S_{31}6$
95.138	4	712.35	$O_{13}4$			23.545	2	651.11			$T_{31}3$
95.448	3	711.68		$O_{23}13$		23.877	1	650.39			$R_{32}11$
95.549	6	711.48	$N_{13}3$			24.097	1	649.91		$S_{21}8$	
95.637	10	711.27	$O_{12}5$			24.361	1	649.35			
96.353	7	709.72	$O_{13}5$			24.541	2	648.97			R_3 11
96.721	6	708.92		$O_{23}14$		25.673	6	646.53			$S_{32}5$
96.849	9	708.65	$O_{12}6$			26.209	2	645.38		[$R_{32}10$	$S_{31}5$
97.547	4	707.14	$O_{13}6$			26.872	1	643.96			R_3 10
97.871	2	706.43		$O_{23}15$		27.412	2	642.80			$T_{31}2$
98.025	10	706.10	$O_{12}7$			27.897	3	641.76		$S_{21}7$	
98.109	4	705.92	$N_{13}4$			28.354	3	640.79			$R_{32}9$
98.713	5	704.61	$O_{13}7$			28.428	3	640.62			$S_{32}4$
98.832	1	704.25				28.546	1	640.38			
99.007	1	703.98				28.949	1	639.51			$S_{31}4$
99.159	8	703.65	$O_{12}8$			29.040	3	639.32			R_3 9
99.837	2	702.18	$O_{13}8$			30.343	2	636.52			$R_{32}8$
6800.251	10	701.29	$O_{12}9$			30.619	1	635.93			
00.368	1	701.03				30.877	1	635.38			$R_{31}8$
00.687	7	700.34	$N_{13}5$			30.965	6	635.19			$S_{32}3$
00.924	4	14 699.83	$O_{13}9$			31.035	6	635.04		[$T_{32}1$	R_3 8
01.076	1d	699.50				31.187	1	634.72			
01.285	6	699.05	$O_{12}10$			31.363	1	634.34			
01.957	1d	697.60	$O_{13}10$			31.466	2	634.08			$S_{31}3$
02.261	7	696.94	$O_{12}11$			31.565	1	633.86		$S_{21}6$	
02.673	1	696.05				32.160	5	632.65			$R_{32}7$
02.936	1	695.49	$O_{13}11$			32.272	1	632.39	R_1 13		
03.085	1	695.16				32.705	0	631.46			$R_{31}7$
03.170	3	694.98	$O_{12}12$			32.844	5	631.17			R_3 7
03.253	4	694.80	$N_{13}6$			33.290	5	630.21			$S_{32}2$
04.013	3	693.16	$O_{12}13$			33.456	1	629.79			
04.777	2	691.51	$O_{12}14$			33.766	5	629.19		[$R_{32}6$	$S_{31}2$
05.473	1	690.01	$O_{12}15$			33.864	1	626.94			

λ	I	ν	Classification 3-0			λ	I	ν	Classification 3-0		
6834.367	3	14 627.91			T_{31}0	6847.944	3	14 598.90		Q_3 11	
34.471	3	627.68			R_3 6	48.206	6	598.34		S_{41}1	
35.162	9	626.21		S_{21}5	R_{32}5	48.334	4	598.07	R_2 8		
35.380	8	625.74			S_{32}1	48.496	1	597.73			
35.559	1	625.36				48.638	1	597.42		Q_{33}11	
35.646	1	625.17	R_1 12			48.763	2	597.16		R_2 3	
35.716	1	625.02			R_{43}5	49.191	2	596.25		Q_2 10	
35.822	2	624.79			S_{31}1	49.285	9	596.04		R_{21}3	
35.893	7	624.64		R_2 9	R_3 5	49.756	2	595.04	Q_1 15		
36.365	4	623.63			R_{32}4	49.876	1	594.79		Q_{33}10	
36.451	2	623.45		R_{32}9		50.123	1	594.26			
36.841	10	622.61			R_{31}4	50.264	2	593.96			P_3 5
37.123	3	622.01			R_3 6	50.326	5	593.83		Q_2 9	
37.345	8	621.53			R_{22}3	50.517	0	593.42		R_2 2	
37.505	1	621.19				50.891	2	592.63		Q_{21}9	
37.820	1	620.52			R_{41}3	51.608	7	592.37		R_{22}2	Q_{21}9]
38.079	3	619.97			R_{32}2	51.120	2	592.14		S_{41}0	
38.147	5	619.82			R_3 3	51.229	1	591.90			
38.324	1	619.44		R_2 8		51.338	9	591.67	R_1 7	Q_2 8	
38.596	3	618.86		S_{21}4	R_{33}2	51.896	2	590.48	Q_1 14	Q_{21}8	
38.905	3	618.20	R_1 11	R_{41}3		52.000	2	590.26		Q_{23}8	P_3 6
38.988	1	618.02			R_3 2	52.145	0	589.95		R_2 1	
39.607	2	616.70			Q_3 13	52.209	7	589.82		Q_2 7	
39.973	1	615.92				52.630	7	588.98		R_{41}1	
40.655	3	614.46		R_2 7		52.693	1	588.79			
40.759	1	614.24			Q_3 12	52.771	3	588.62		Q_{11}7	
41.059	1	613.60			Q_{33}11	52.913	4	588.32		Q_{21}7	
41.217	7	613.26		R_{21}7		52.975	3	588.19		Q_2 6	
41.738	4	612.15			Q_3 11	53.478	4	587.12			P_3 7
41.851	1	611.91				53.527	2	587.01		Q_{21}6	
41.926	7	611.74		S_{21}3	Q_{32}10	53.611	5	586.83		Q_2 5	
42.1[illegible]	2	611.30	R_1 10		Q_{32}3	53.684	3	586.68		Q_{33}6	
42.5[illegible]		610.52				53.786	1	586.46			
42.5[illegible]		610.41		[Q_3 10	Q_{32}9	53.956	2	586.10	Q_1 13		
42.74[illegible]	1	609.99			Q_{32}4	54.044	1	585.91		R_{21}0	
42.856	2	609.76		R_2 6		54.155	6	585.67		Q_{11}5	Q_2 4]
42.918	4	609.55		[Q_3 3	Q_{32}8	54.294	6	585.38	R_1 6		
43.132	2	609.17			Q_{32}5	54.344	7	585.27		Q_{33}5	
43.208	8	609.00		[Q_3 9	Q_{32}7	54.444	1	585.06			
43.293	1	608.83			Q_{02}6	54.547	2	584.84		Q_2 3	
43.412	4	608.57		R_{32}6		54.675	2	584.57		Q_{31}4	
43.513	3	608.36			Q_3 4	54.770	2	584.37			P_3 8
43.590	1	608.19				54.873	4	584.11		Q_{21}4	
43.659	4	608.04			Q_3 8	54.991	1	583.90			
43.858	8	607.62			Q_3 5	55.071	4	583.73		Q_{21}3	
43.927	8	607.47			Q_3 7	55.358	9	583.12	Q_{12}12	Q_{23}3	Q_{34}2]
43.996	3	607.33			Q_3 6	55.506	1	582.80		Q_{41}1	
44.939	3	605.31		R_2 5		55.768	5	582.24		Q_{33}2	
45.031	1	605.07		Q_2 13		55.651	3	582.07			P_3 9
45.129	3	604.91		S_{21}2		55.935	2	581.89	Q_1 12		
45.269	4	604.51	R_1 [illegible]			56.309	9	581.09		Q_{23}1	
45.487	9	604.14		R_{31}5		56.745	2	580.16			P_3 10
46.562	1	601.85		Q_2 12		56.947	1	579.74			
[illegible]	1	601.09		R_2 4		57.061	1	579.49			
47.445	6	14 599.97		R_{31}4		57.187	10	579.23	R_1 5		

λ	I	ν	Classification 3-0		
6857.273	1	14 579.04	Q_{12}11		
57.454	3	578.66			P_3 11
57.589	1	578.37			
57.722	1	578.09			
57.832	7	577.85	Q_1 11		
57.977	1	577.55			P_3 12
58.343	1	576.77			P_3 13
58.557	1	576.31			
58.697	7	576.02		P_{23}2	
59.077	1	575.21	Q_{12}10		
59.654	6	573.98	Q_1 10		
59.759	10	573.76		P_{23}3	
59.913	1	573.43			
60.038	6	573.17	R_1 4		
60.789	8	571.57		P_{23}4	
60.838	2	571.47	Q_{12}9		
61.002	1	571.12		P_2 5	
61.408	10	570.26	Q_1 9		
61.587	1	569.88			
61.730	10	569.57		P_{23}5	
61.857	1	569.30		P_2 6	
62.577	8	567.78	Q_{12}8	P_{23}6	P_2 7]
62.669	4	567.58		O_{23}3	
62.757	1	567.39			
62.849	8	567.20	R_1 3		
62.984	1	566.91			
63.093	7	566.68	Q_1 8		
63.222	1	566.40		P_2 8	
63.306	9	566.23		P_{23}7	
63.731	3	565.33		P_2 9	
63.926	4	564.91		P_{23}8	
64.024	1	564.70			
64.106	2	564.53		P_2 10	
64.162	4	564.41	Q_{12}7		
64.251	1	564.22			
64.363	2	563.98		P_2 11	
64.424	6	563.85		P_{23}9	
64.493	1	563.71		P_2 12	
64.724	10	563.22	Q_1 7		
64.796	2	563.07		P_{23}10	
64.893	1	562.86			
64.932	1	562.67			
65.053	4	562.52		P_{23}11	
65.158	5	562.30		O_{23}4	
65.417	1	561.75			
65.505	1	561.56			
65.620	4	561.32	R_1 2		
65.741	2	561.05	Q_{12}6		
66.300	9	559.87	Q_1 6		
67.281	6	557.80	Q_{12}5		
67.411	1	557.52			
67.539	7	557.25		O_{23}5	
67.672	1	556.97			
67.829	10	556.63	Q_1 5		
68.349	6	555.53	R_1 1		
6868.776	4	14 554.63	Q_{12}4		
69.316	10	553.48	Q_1 4		
69.831	4	552.39		O_{23}6	
70.243	6	551.52	Q_{12}3		
70.382	1	551.23			
70.765	10	550.41	Q_1 3		
70.879	1	550.17			
71.007	2	549.90	R_1 0		
71.295	1	549.29			
71.584	1	548.68	P_1 15		
71.682	3	548.47	Q_{12}2		
71.809	1	548.20			
72.020	7	547.76		O_{23}7	
72.092	1	547.60			
72.175	7	547.43	Q_1 2		
72.287	1	547.19	P_{12}13	P_1 14]	
72.803	1	546.10	P_{12}12		
72.873	2	545.95	P_1 13		
73.095	2	545.48	Q_{12}1		
73.180	1	545.30			
73.256	3	545.14	P_{12}11		
73.398	2	544.84	P_1 12		
73.544	10	544.53	Q_1 1		
73.630	3	544.35	P_{12}10		
73.730	1	544.14			
73.833	5	543.92	P_1 11		
73.928	7	543.72	P_{12}9		
74.013	1	543.54			
74.096	3	543.36		O_{23}8	
74.182	6	543.18	P_1 10	P_{12}8]	
74.276	1	542.98			
74.359	10	542.81	P_{12}7		
74.435	1	542.65			
74.501	10	542.51	P_1 9	P_{12}6]	
74.606	10	542.28	P_{12}5		
74.676	6	542.14	P_{12}4		
74.723	10	542.04	P_1 8	P_{12}3]	
74.768	10	541.94	P_{12}2	P_{12}1]	
74.833	3	541.80	Q_1 0		
74.919	9	541.62	P_1 7		
74.992	1	541.47			
75.061	6	541.32	P_1 6		
75.150	9	541.13	P_1 5	P_1 0]	
75.241	10b	540.94	$P_1$1-4		
76.056	4	539.22		O_{23}9	
77.244	6	536.71	O_{12}1		
77.893	2	535.34		O_{23}10	
78.598	5	533.85	O_{12}2	O_{13}1]	
79.604	3	531.72		O_{23}11	
79.804	1	531.30	N_{13}2		
79.935	10	531.02	O_{12}3		
80.062	1	530.75			
80.746	3	529.31	O_{13}3		
81.203	1	528.34		O_{23}12	
81.257	6	528.23	O_{12}4		

λ	I	ν	Classification 3-0		
6882.018	2	14 526.62	$O_{13}4$		
82.438	3	525.73	$N_{13}3$		
82.554	10	525.49	$O_{12}5$		
82.661	1	525.26		$O_{23}13$	
83.287	4	523.94	$O_{13}5$		
83.820	7	522.82	$O_{12}6$		
84.547	1	521.29	$O_{13}6$		
85.053	9	520.22	$O_{12}7$	$N_{13}4]$	
85.196	1	519.92			
85.758	2	518.73	$O_{13}7$		
86.250	4	517.69	$O_{12}8$		
86.954	1	516.21	$O_{13}8$		
87.398	7	515.27	$O_{12}9$		
87.796	3	514.44	$N_{13}5$		
88.089	1	513.82	$O_{13}9$		
88.492	3	512.97	$O_{12}10$		
89.523	4	510.80	$O_{12}11$		
90.220	0	509.33	$O_{13}11$		
90.480	3	508.78	$O_{12}12$	$N_{13}6]$	
91.202	00	507.26	$O_{13}12$		
91.388	2	506.87	$O_{12}13$		
92.953	1d	503.58			
93.128	3	503.21	$N_{13}7$		
95.766	1	14 497.66	$N_{13}8$		
98.347	2	492.24	$N_{13}9$		
6901.930	1	484.71			
02.905	1	482.67			

Gap in the measurements which contains the following bands. The listing is for the $P_1 1$ line which coincides with the most prominent head.

λ	I	ν	band
6957.72	2	14 368.56	9-7
7059.48.	2	14 161.45	8-6
7164.63	1	13 953.23	7-5

λ	I	ν	Classification 6-4		
7203.430	1d	13 878.36		$S_{31}11$	
04.375	3	876.64			$S_{32}9$
07.523	2	870.38			$T_{31}5$
08.330	2	869.02			$S_{32}8$
09.421	1d	866.92			
09.810	1	866.18			$R_{12}13$
10.539	2	864.77			$R_3 13$
12.082	6	861.81			$S_{32}7$
12.340	2	861.31			$T_{31}4$
12.693	2d	860.63			$S_{31}7$
7212.837	3	13 860.36		$S_{21}9$	
12.952	0	860.14			$R_{32}12$
13.676	1	858.75			$R_3 12$
15.611	4	855.03			$S_{32}6$
15.887	2	854.50			$R_{32}11$
16.210	1bd	853.88			$S_{31}6$
16.434	0bd	853.45			$R_{31}11$
16.620	4d	853.09			$R_3 11$
16.818	5	852.71		$R_2 13$	$T_{31}3$
17.037	1	852.29			
17.289	2	851.81		$S_{21}8$	
17.449	1	851.50		$R_{21}13$	
18.631	2	849.23			$R_{32}10$
18.913	8	848.69			$S_{32}5$
19.261	1	848.02			$R_{31}10$
19.377	4	847.80			$R_3 10$
19.505	3	847.55			$S_{31}5$
20.317	0	846.00		$R_2 12$	
21.036	3	844.62			$T_{31}2$
21.179	5	844.35			$R_{32}9$
21.583	5	843.57		$S_{21}7$	
21.709	1	843.33			
21.807	1	843.14			$R_{31}9$
21.922	6	842.92			$R_3 9$
21.901	6	842.81			$S_{32}4$
22.563	2	841.69			$S_{31}4$
23.508	4	839.88			$R_{32}8$
23.626	2	839.66		$R_2 11$	
24.258	6	838.45		$R_{21}11$	$R_3 8$
24.642	1d	837.71			
24.801	9	837.40			$S_{32}3$
24.914	1	837.19			
24.972	6	837.08			$T_{31}1$
25.102	1	836.83			
25.192	1	836.66			
25.290	2	836.47	$R_1 13$		
25.365	4	836.32			$S_{31}3$
25.618	8	835.84			$R_{32}7$
25.726	3	835.63		$S_{21}6$	
26.241	1	834.65			$R_{31}7$
26.383	8	834.38			$R_3 7$
26.794	2	833.59		$R_2 10$	
27.357	6	832.51			$S_{32}2$
27.412	2	832.41		$R_{21}10$	
27.502	6	832.23			$R_{32}6$
27.890	3	831.47			$S_{31}2$
28.127	0	831.04			$R_{31}6$
28.276	5	830.75			$R_3 6$
28.578	5	830.18			$T_{31}0$
28.686	2	829.97			$Q_3 15$
29.145	9	829.09			$R_{32}5$
29.245	1	828.90	$R_1 12$		
29.358	0	828.68		$Q_2 17$	
29.593	1	828.23			
29.647	9	828.13			$S_{31}1$

λ	I	ν	Classification 6-4			λ	I	ν	Classification 6-4		
7229.718	7	13 827.99		-$S_{21}5$	$R_{31}5$	7238.404	1	13 811.40			
29.796	4	827.84		$R_2 9$		38.489	10	811.24		$R_{31}6$	
29.870	1	827.70				38.536	10	811.15		[$Q_3 6$	$Q_3 5$
29.939	9	827.57			$R_3 5$	38.611	2	811.01		$Q_3 13$	
30.149	5	827.21			$S_{31}1$	40.131	1	808.11			
30.255	1d	826.97				40.279	6	807.82		$R_2 5$	
30.404	5	826.66		$R_{21}9$		40.465	7	807.47	$R_1 9$		
30.530	6	826.44			$R_{32}4$	40.553	2	807.30		$Q_2 12$	
30.578	1	826.35			$Q_3 14$	40.673	1	807.07			
30.843	1bd	825.84				40.777	6	806.87		$S_{21}2$	
31.118	1d	825.32			$R_{31}4$	40.874	10	806.69		$R_{21}5$	
31.360	5	824.85			$R_3 4$	41.020	1	806.41			
31.512	1	824.56			$Q_{32}13$	41.667	2	805.18			
31.660	9	824.28			$R_{32}3$	41.987	1bd	804.57			
31.895	0	823.83		$Q_2 16$		42.206	1	804.15			
32.238	1	823.18			$R_{31}3$	42.306	7	803.96		$Q_2 11$	
32.307	5	823.04			$Q_3 13$	42.451	1	803.68			
32.405	1	822.86				42.527	2	803.54		$R_2 4$	
32.442	1	822.71				42.790	1bd	803.04			
32.532	9	822.61		[$R_{32}2$	$R_3 3$	42.934	2	802.76		$Q_{21}11$	
32.643	2	822.40		$R_2 8$		43.055	2	802.53		$Q_{31}11$	
33.091	5	821.55	$R_1 11$	[$R_{31}2$	$Q_{32}12$	43.105	9	802.44		$R_{21}4$	
33.264	4	821.22		$R_{21}8$		43.281	1d	802.10			
33.505	3	820.75			$R_3 2$	43.413	2	801.85			$P_3 4$
33.557	5	820.65		$S_{21}4$		43.474	3	801.73			
33.709	1	820.36				43.549	1	801.59			
33.825	3	820.14			$Q_3 12$	43.656	0	801.39	$Q_1 15$		
34.298	1	819.24		$Q_2 15$		43.773	1	801.16			
34.412	1	819.02			$Q_{32}11$	43.857	1	801.00			
34.695	1bd	818.48				43.915	5	800.89		$Q_2 10$	
35.150	8	817.61			$Q_3 11$	44.005	6	800.72	$R_1 8$		
35.258	1	817.41				44.090	1	800.56			
35.340	5	817.25		$R_2 7$		44.147	8	800.45		$S_{21}1$	
35.633	1	816.83			$Q_{32}10$	44.546	1	15 799.69		$Q_{21}10$	
35.954	9	816.08		$R_{21}7$		44.618	3	799.55		$R_2 3$	
36.170	1	815.66				44.672	1	799.45		$Q_{31}10$	
36.268	5	815.48			$Q_3 10$	44.913	1	798.99			
36.428	2	815.17			$Q_{32}9$	45.042	1	798.75			
36.531	1	814.97		$Q_2 14$		45.139	1	798.56			
36.755	1	814.55				45.190	13	798.47		$R_{21}3$	
36.829	5	814.41	$R_1 10$		$Q_{32}3$	45.295	1	798.27			
36.959	1	814.16				45.369	9	798.12		$Q_2 9$	$P_3 5$
37.114	2	813.86			$Q_{32}8$	45.824	1d	797.14			
37.175	9	813.74			$Q_3 9$	45.929	6	796.94		$Q_{21}9$	
37.247	9	813.61		$S_{21}3$		46.054	1	796.82			
37.398	2	813.32			$Q_{32}4$	46.124	6	796.68		$Q_{31}9$	
37.477	1	813.17				46.233	0	796.48	$Q_1 14$		
37.553	3	813.02			$Q_{32}7$	46.599	2	795.78		$R_2 2$	
37.705	9	812.73			$Q_3 3$	46.666	5	795.66		$Q_2 8$	
37.749	6	812.65		[$Q_{32}6$	$Q_{31}5$	47.119	8	794.79		$R_{21}2$	$P_3 6$
37.867	9	812.43		$R_2 6$	$Q_3 8$	47.302	4	794.44	[$S_{21}0$	$Q_{21}8$	
37.995	1	812.18				47.447	9	794.17	$R_1 7$	$Q_{31}8$	
38.120	1	811.94				47.691	1	793.70			
38.232	5	811.73			$Q_3 4$	47.808	8	793.48		$Q_2 7$	
38.320	9	811.56			$Q_3 7$	48.104	0	792.92	$Q_{12}13$		

λ	I	ν	Classification 6-4		
7248.285	1	13 792.57			
48.424	7	792.31		$Q_{21}7$	R_2 1]
48.533	1	792.10			
48.587	9	792.00		$Q_{23}7$	P_3 7
48.668	1	791.85			
48.727	6	791.73	Q_1 13		
48.797	5	791.60		Q_2 6	
48.894	8	791.41		$R_{21}1$	
49.292	1	790.66			
49.406	4	790.44		$Q_{21}6$	
49.507	1	790.25			
49.581	6	790.11		$Q_{23}6$	
49.638	7	790.00		Q_2 5	
49.738	1	789.81			
49.821	3	789.65			P_3 8
50.234	7	788.86		$Q_{21}5$	
50.331	2	788.68		Q_2 4	
50.440	9	788.47		$Q_{23}5$	$R_{21}0$]
50.734	1	787.91			
50.812	9	787.77	R_1 6		P_3 9
50.910	4	787.58		$Q_{21}4$	Q_2 3]
51.047	1	787.32			
51.166	8	787.09	Q_1 12	$Q_{23}4$	
51.265	1	786.91		Q_2 2	
51.354	1	786.73			
51.437	6	786.58		$Q_{21}3$	
51.547	4	786.37		Q_2 1	P_3 10
51.620	1	786.23			
51.696	1	786.09			
51.752	10	785.98		$Q_{23}3$	
51.811	2	785.87		$Q_{21}2$	
51.914	1	765.67			
52.026	2	785.46		$Q_{21}1$	
52.077	6	785.36			P_3 11
52.189	1	785.15			
52.275	6	784.99		$Q_{23}2$	
52.381	2	784.78		[P_3 14	P_2 12
52.488	2	784.58			P_3 13
52.705	1	784.17			
52.861	2	783.87			
52.908	10	783.78	$Q_{12}11$		$Q_{13}1$
53.030	1	783.55			
53.484	1	782.69			
53.533	9	782.59	Q_1 11		
54.055	1	781.60			
54.104	9	781.51	R_1 5		
55.061	1d	779.69			
55.157	2d	779.51	$Q_{12}10$		
55.268	1d	779.30			
55.433	8	778.93		$P_{23}2$	
55.515	2	778.83			
55.638	1	778.60		P_1 3	
55.779	8	778.33	Q_1 10		
56.465	2	777.03			
56.511	10b	776.94		$P_{21}3$	

λ	I	ν	Clas. ..catica . -4		
7256.687	1	13 776.60		P_2 4	
57.130	15d	775.76			
57.314	9	775.41	$Q_{12}9$	R_1 4]	
57.449	1	775.16			
57.516	9	775.03		$P_{23}4$	
57.606	2	774.86		P_2 5	
57.878	2	774.34		P_2 16	
57.931	10b	774.24	Q_1 9		
58.093	1	773.93			
58.189	1	773.75			
58.287	1	773.57			
58.354	5	773.44			
58.406	10b	773.34		$P_{23}5$	P_2 6]
58.795	1	772.60			
59.023	5	772.17		P_2 7	
59.106	2	772.01		P_2 14	
59.172	9	771.69		$P_{23}6$	
59.270	1	771.70			
59.364	3	771.52	$Q_{12}8$		
59.440	1	771.38			
59.510	3	771.25		P_2 8	
59.582	3	771.11		P_2 13	
59.653	5	770.97		$Q_{23}3$	
59.737	2	770.82			
59.785	10	770.72		$P_{23}7$	
59.829	9	770.64		P_2 9	
59.915	1	770.48		P_2 12	
59.987	10	770.34	Q_1 8		
60.030	4	770.26		P_2 10	P_2 11]
60.104	1	770.12			
60.188	1	769.96			
60.272	7	769.80		[illegible]	
60.384	1	769.59			
60.460	9	769.44	R_1 3		
60.533	1	769.30			
60.588	9	769.20		$P_{23}9$	
60.678	1	769.03			
60.756	8	768.88		$P_{23}10$	$P_{23}11$]
61.059	1	768.31			
61.278	1	767.89			
61.335	8	767.78	$Q_{12}7$		
61.903	5	766.71			
61.946	10b	765.63	Q_1 7		
62.097	1	766.34			
62.218	5	766.11		$Q_{23}4$	
62.382	1	765.80			
62.970	1	764.69			
63.118	1	764.40			
63.227	5	764.20	$Q_{12}6$		
63.539	6	763.61	R_1 2		
63.683	1	763.33			
63.785	3	763.14			
63.835	10	763.05	Q_1 6		
64.138	1	762.47			
64.394	1bd	761.99			

λ	I	ν	Classification 6-4		
7264.679	9	13 761.45		$O_{23}5$	
64.608	1	761.20			
64.925	1	760.98			
64.997	1	760.85			
65.046	9	760.75	$Q_{12}5$		
65.481	1	759.93			
65.640	10b	759.63	$Q_1 5$		
65.991	1d	758.96			
66.364	1	758.26	$P_{12}15$		
66.543	8	757.92	$R_1 1$		
66.669	1	757.68			
66.794	7	757.44	$Q_{12}4$		
66.898	1	757.25			
67.095	8	757.04	$P_1 15$	$O_{23}6$	
67.253	1	756.57			
67.354	10	756.33	$Q_1 4$		
67.503	00	756.10	$P_{12}14$		
68.119	1	754.93	$P_1 14$		
68.275	1d	754.64			
68.437	1	754.33			
68.485	10	754.24	$Q_{12}3$	$P_{12}13]$	
68.714	1	753.81			
69.056	10b	753.16	$Q_1 3$		
69.108	7	753.06	$P_1 13$		
69.195	9	752.90		$O_{23}7$	
69.369	2	752.57	$P_{12}12$		
69.441	2	752.43	$R_1 0$		
69.582	1d	752.17			
69.861	1	751.64			
69.999	4	751.38	$P_1 12$		
70.135	9	751.12	$Q_{12}2$	$P_{12}11]$	
70.513	1	750.49			
70.620	1	750.20			
70.664	9	750.12	$Q_1 2$		
70.729	1	750.00			
70.777	7	749.91	$P_1 11$		
70.827	6	749.81	$P_{12}10$		
71.246	6	749.02		$O_{23}8$	
71.404	10	748.72	$P_{12}9$		
71.456	9	748.62	$P_1 10$		
71.544	1	748.46			
71.632	1	748.29	$P_{13}10$		
71.709	5	748.14	$Q_{12}1$		
71.781	1	748.01			
71.849	1	747.88			
71.906	8	747.77	$P_{12}8$		
71.977	1	747.64			
72.035	9	747.53	$P_1 9$		
72.113	1	747.38			
72.195	10	747.23	$Q_1 1$	$P_{13}9]$	
72.260	1	747.10			
72.316	10	747.00	$P_{12}7$		
72.413	1	746.81			
72.477	1	746.69			
72.525	8	746.60	$P_1 8$		

λ	I	ν	Classification 6-4		
7272.598	1	13 746.46			
72.657	9	746.35	$P_{12}6$	$P_{13}8]$	
72.798	1	746.09			
72.900	10	745.89	$P_1 7$		
72.951	10b	745.80	$P_{12}5$		
73.036	1	745.64			
73.090	2	745.53	$P_{13}7$		
73.143	10b	745.43	$P_{12}4$	$O_{23}9$	
73.213	1	745.30			
73.261	10	745.21	$P_1 6$		
73.311	10b	745.11	$P_{12}3$		
73.367	1	745.01			
73.420	8	744.91	$P_{12}2$	$P_{13}6]$	
73.494	10	744.77	$P_{12}1$		
73.533	10	744.70	$P_1 5$		
73.615	5	744.54	$Q_1 0$		
73.679	1	744.42			
73.734	8	744.32	$P_1 4$	$P_{13}5]$	
73.820	2	744.15			
73.879	10b	744.04	$P_1 3$		
73.975	10	743.86	$P_1 0,1,2$	$P_{13}4]$	
74.155	1	743.52	$P_{13}3$		
74.880	3	742.15		$O_{23}10$	
75.569	2	740.87			
76.058	1	739.93			
76.198	9	739.06	$O_{12}1$		
76.473	4	739.14		$O_{23}11$	
77.085	1	737.99			
77.433	1d	737.33			
77.605	7	737.01	$O_{12}2$		
77.900	1	736.45		$O_{23}12$	
78.608	1	735.11	$O_{13}2$		
78.922	2	734.52	$N_{13}2$		
78.973	10b	734.42	$O_{12}3$		
79.164	2	734.06		$O_{23}13$	
79.732	1	732.99			
79.862	5	732.74	$O_{13}3$		
80.287	10	731.95	$O_{12}4$		
80.860	1	730.86			
81.122	3	730.37	$O_{13}4$		
81.224	0	730.18		$O_{23}15$	
81.334	1	729.97			
81.509	3	729.64			
81.558	10b	729.55	$O_{12}5$		
81.655	3	729.37	$N_{13}3$		
82.253	1	728.24			
82.365	5	728.03	$O_{13}5$		
82.770	8	727.26	$O_{12}6$		
83.315	1	726.24			
83.560	2	725.77	$O_{13}6$		
83.855	1	725.22			
83.917	10b	725.10	$O_{12}7$		
84.445	2	724.11	$N_{13}4$		
94.595	1d	723.82			
84.697	4	723.63	$O_{13}7$		

λ	I	ν	Classification 6-4		5-3	
7284.881	1	13 723.29				
84.998	6	723.06	$O_{12}8$			
85.623	1	721.89				
85.748	2	721.63	$O_{13}8$			
85.880	1	721.40				
86.003	9	721.17	$O_{12}9$			
86.766	2	719.74	$O_{13}9$			
86.925	4	719.44	$O_{12}10$			
87.087	1	719.13				
87.209	4	718.90	$N_{13}5$			
87.690	1	718.00	$O_{13}10$			
87.755	6	717.87	$O_{12}11$			
88.245	1	716.95				
88.502	3	716.47	$O_{12}12$	$O_{13}11$]		
89.038	1	715.46				
89.134	3	715.28	$O_{12}13$	$O_{12}14$]		
89.936	2	713.77	$N_{13}6$			
90.171	1	713.33				
90.545	1	712.62				
91.253	1	711.29				
92.625	4	708.71	$N_{13}7$			
92.896	1bd	708.20				
93.198	1bd	707.64				
94.677	1	704.86				
95.259	1	703.76	$N_{13}8$			
97.679	1	13 699.22				
97.831	3	698.93	$N_{13}9$			
7300.321	1	694.26	$N_{13}10$			
00.528	1	693.87				
00.736	2	693.48				
01.482	1	692.08				$S_{32}12$
02.625	1	689.94				
02.742	1	689.72	$N_{13}11$			
03.669	2	687.98				
06.201	2	683.24				$S_{32}11$
07.866	1	680.12				$T_{31}7$
10.710	1	674.80				$S_{32}10$
13.229	1d	670.09				$T_{31}6$
13.965	1bd	668.72			$S_{21}11$	
14.427	1d	667.85				$R_3 15$
15.038	4	666.71				$S_{32}9$
18.383	3	660.45				$T_{31}5$
18.908	1	659.46			$S_{21}10$	
19.153	3	659.02				$S_{32}8$
20.762	2	656.02				$R_{32}13$
21.514	2	654.62				$R_3 13$
23.056	8	651.75				$S_{32}7$
23.146	1	651.58				
23.318	2	651.26				$T_{31}4$
23.684	6	650.57			$S_{21}9$	
23.995	1d	650.00				$R_{32}12$
24.770	2	648.55				$R_3 12$
24.837	1	648.43				
26.730	6	644.90				$S_{32}6$
26.891	1d	644.60				

λ	I	ν	Classification 5-3		
7327.064	3	13 644.28			$R_{32}11$
27.356	1	643.73			$S_{31}6$
27.716	0	643.06			$R_{31}11$
27.832	6	642.85			$R_3 11$
27.967	8	642.60		$R_2 13$	$T_{31}3$
28.041	1	642.46	$R_1 15$		
28.185	1d	642.19			
28.307	3	641.96		$S_{21}8$	
28.591	1	641.43		$R_{21}13$	
29.922	3	638.96			$R_{32}10$
30.178	10	638.48			$S_{32}5$
30.555	0	637.78			$R_{31}10$
30.693	3	637.52			$R_3 10$
30.788	4	637.35			$S_{31}5$
31.124	1	636.72			
31.530	1	635.97		$R_2 12$	
32.189	1bd	634.74		$R_{21}12$	
32.377	5	634.39	$R_1 14$		$T_{31}2$
32.567	6	634.04			$R_{32}9$
32.660	1	633.87			
32.778	6	633.65		$S_{21}7$	
33.230	1	632.81			$R_{31}9$
33.358	10b	632.57		[$R_3 9$	$S_{32}4$
33.472	0	632.36			$Q_3 18$
33.975	3	631.42			$S_{31}4$
34.986	8	629.54		$R_2 11$	$R_{32}8$
35.347	1	628.87			
35.628	4	628.35		$R_{21}11$	$R_{31}8$
35.774	5	628.08			$R_3 8$
35.988	1	627.68			$Q_3 17$
36.258	2	627.18			
36.314	10b	627.08			$S_{32}3$
36.402	1	626.91			
36.488	9	626.75			$T_{31}1$
36.595	2	626.55	$R_1 13$		
36.898	8	625.99			$S_{31}3$
37.007	1d	625.79			
37.090	6	625.63		$S_{21}6$	
37.188	10	625.45			$R_{32}7$
37.525	1	624.83			
37.832	1	624.26			$R_{31}7$
37.980	10	623.98			$R_3 7$
38.267	2	623.45		$R_2 10$	
38.335	1	623.32			$Q_3 16$
38.918	3	622.24		$R_{21}10$	
38.988	9	622.11			$S_{32}2$
39.148	8	621.81			$R_{32}6$
39.543	4	621.08			$S_{31}2$
39.768	1bd	620.66		[$Q_{32}15$	$R_{31}6$
39.955	8	620.32			$R_3 6$
40.115	1	620.02			
40.259	8	619.75			$T_{31}0$
40.488	3	619.33			$Q_3 15$
40.700	3	618.93	$R_1 12$		
40.808	2	618.73			

λ	I	ν	Classification 5-3		
7340.856	10b	13 618.64			$R_{32}5$
41.114	1	618.16			
41.198	1	618.01			
41.245	10	617.92		$S_{21}5$	
41.377	10b	617.68		$R_2 9$	
41.497	1	617.45			$R_{31}5$
41.568	1	617.32			
41.683	10	617.11			$R_3 5$
41.795	1	616.90			
41.877	7	616.75			$S_{31}1$
41.958	1	616.60			
42.026	7	616.47		$R_{21}9$	
42.155	1	616.23			
42.306	9	615.95			$R_{32}4$
42.460	2	615.67			$Q_3 14$
42.914	1	614.83			$R_{31}4$
43.104	1	614.48			
43.164	8	614.36			$R_3 4$
43.272	1	614.16			
43.366	1	613.99			
43.431	2	613.87			$Q_{32}13$
43.486	10b	613.77			$R_{32}3$
44.066	2	612.69			$R_{31}3$
44.235	7	612.38			$Q_3 13$
44.334	6	612.19		$R_2 8$	
44.391	10b	612.09			$R_3 3$
44.554	1bd	611.79			
44.677	6	611.55	$R_1 11$		
44.823	1	611.29			
44.981	6	611.00		$R_{21}8$	$R_{32}2$
45.103	1	610.77			
45.243	7	610.51		$S_{21}4$	
45.404	5	610.21			$R_3 2$
45.805	5	609.47			$Q_3 12$
46.214	3	608.71			
46.409	2	608.35			$Q_{32}11$
46.998	1	607.26			
47.165	10b	606.95		$R_2 7$	$Q_3 11$
47.378	1d	606.55			
47.558	2	606.22			$Q_{32}10$
47.777	10	605.85		$R_{21}7$	
47.945	1	605.51			
48.101	1	605.22			
48.216	1	605.00			
48.336	8	604.78			$Q_3 10$
48.427	1	604.61			
48.497	6	604.48			$Q_{32}9$
48.557	6	604.37	$R_1 10$		
48.755	1	604.01			
48.884	4	603.77			$Q_{32}3$
48.964	1	603.62			
49.032	2	603.49			
49.083	10b	603.40		$S_{21}3$	
49.199	3	603.18			$Q_{32}8$
49.274	10	603.04			$Q_3 9$

λ	I	ν	Classification 5-3		
7349.398	1	13 602.81			
49.489	4	602.65			$Q_{32}4$
49.565	1	602.51			
49.653	7	602.34			$Q_{32}7$
49.727	2	602.21			
49.795	10	602.08		$R_2 6$	$Q_3 3$
49.850	5	601.98		$[Q_{32}6$	$Q_{32}5$
49.977	9	601.74			$Q_3 8$
50.208	1	601.32			
50.349	8	601.06			$Q_3 4$
50.416	10	600.93		$R_{21}6$	
50.459	10	600.85			$Q_3 7$
50.545	1	600.69			
50.622	10	600.55			$Q_3 5$
50.683	10	600.44		$Q_2 13$	$Q_3 6$
50.887	1bd	600.06			
51.305	0	13599.29		$Q_{21}13$	
51.451	0	599.02		$Q_{23}13$	
52.272	9	597.50		$R_2 5$	
52.332	10	597.39	$R_1 9$		
52.562	1	596.96			
52.661	4	596.78		$Q_2 12$	
52.765	8	596.59		$S_{21}2$	
52.837	3	596.45			
52.893	10b	596.35		$R_{21}5$	
53.269	1	595.65		$Q_{21}12$	
53.435	0	695.35		$Q_{23}12$	
54.281	1bd	693.78			
54.410	1	693.54			
54.485	9	693.41		$Q_2 11$	
54.552	1	693.28			
54.610	3	693.17		$R_2 4$	
54.990	1	692.47	$Q_{12}15$		
55.142	2	692.19		$Q_{21}11$	
55.212	10	692.06		$R_{21}4$	
55.257	6	691.98		$Q_{23}11$	
55.379	1	691.75			
55.516	1	691.50			
55.626	4	691.30	$Q_1 15$		
55.762	2	691.05			$P_3 4$
55.891	1	690.81			
56.003	8	690.60	$R_1 8$		
56.078	1	690.46			
56.148	7	590.33		$Q_2 10$	
56.221	1	590.20			
56.283	10	590.08		$S_{21}1$	
56.581	1	589.53			
56.791	7	589.14		$R_2 3$	$Q_{31}10]$
56.916	2	588.91		$Q_{23}10$	
57.155	1	588.47			
57.253	1	583.29			
57.327	2	588.16			
57.378	10b	588.06		$R_{21}3$	
57.514	1	587.81			
57.599	1	587.65			

λ	I	ν	Classification 5-3		
7357.649	10	13 587.56		Q_2 9	
57.749	1	587.38			
57.837	6	587.21			P_3 5
58.124	1d	586.68			
58.292	6	586.37		Q_{21}9	
58.377	2	586.22			
58.422	7	586.13	Q_1 14	Q_{23}9	
58.571	1	585.86			
58.835	2	585.37		R_2 2	
58.923	1	585.21			
58.988	7	585.09		Q_2 8	
59.191	1bd	584.71			
59.337	1	584.44			
59.392	9	584.34		R_{21}2	
59.464	1	584.21			
59.528	1	584.09			
59.585	10	583.99	R_1 7		
59.640	8	583.88	[S_{21} 0	Q_{21}8	P_3 6
59.770	5	583.64		Q_{23}8	
59.944	1	583.32			
60.067	1	583.10			
60.161	10	582.92		Q_2 7	
60.400	1	582.48	Q_{12}13		
60.743	1	581.85		R_2 1	
60.801	8	581.74		Q_{21}7	
60.895	1	581.57			
60.961	9	581.45		Q_{23}7	
61.051	8	581.28	Q_1 13		
61.119	1	581.16			
61.177	10	581.05		Q_2 6	P_3 7
61.242	10	580.93		R_{21}1	
61.630	1	580.21			
61.813	7	579.88		Q_{21}6	
61.907	1	579.70			
61.991	8	579.55		Q_{23}6	
62.049	9	579.44		Q_2 5	
62.225	1bd	579.12			
62.476	6	578.65			P_3 8
62.555	1	578.51			
62.663	8	578.31		Q_{21}5	
62.749	5	578.15		Q_2 4	
62.823	2	578.01			
62.877	10b	577.91		Q_{23}5	R_{21}0]
62.997	1	577.69			
63.078	9	577.54	R_1 6		
63.213	1	577.29			
63.308	6	577.12		Q_2 3	
63.366	6	577.01		Q_{21}4	
63.433	1	576.89			
63.506	8	576.75			P_3 9
63.573	4	576.63	Q_1 12		
63.609	9	576.56		Q_{23}4	
63.750	1	576.33		Q_2 2	
63.900	8	576.03		Q_{21}3	
64 036	1	575.78		Q_2 1	

λ	I	ν	Classification 5-3		
7364.171	2	13 575.53			
64.226	10	575.43		Q_{23}3	
64.290	8	575.31		Q_{21}2	P_3 10
64.415	1	575.08			P_3 16
64.502	3	574.92		Q_{21}1	
64.605	1	574.73			
64.698	1	574.56			
64.736	9	574.49		Q_{23}2	
64.858	7	574.26			P_3 11
64.939	2	574.11			P_3 15
65.077	1	573.86			
65.195	4	573.64			P_3 12
65.241	3	573.55			P_3 14
65.314	5	573.42			P_3 13
65.354	4	573.33	Q_{12}11		
65.422	10	573.22		Q_{23}1	
65.704	1	572.70			
65.956	2	572.24			
66.009	10	572.14	Q_1 11		
66.113	1	571.95			
66.306	1d	571.59			
66.430	3d	571.36			
66.488	10b	571.26	R_1 5		
67.679	2	569.06	Q_{12}10		
67.878	1	568.70			
68.013	2	568.45			
68.067	10	568.35		P_{23}2	
68.172	1	568.16			
68.278	2	567.96		P_2 3	
68.325	10	567.87	Q_1 10		
69.191	10bb	566.28		P_{23}3	
69.387	1	565.92		P_2 4	
69.679	1	565.38			
69.830	10	565.10	R_1 4		
69.897	7	564.98	Q_{12}9		
70.020	1	564.75			
70.130	1	564.55			
70.200	2	564.42			
70.251	10	564.33		P_{23}4	
70.365	4	564.12		P_2 5	
70.434	1	563.99			
70.487	4	563.89			
70.543	10b	563.79	Q_1 9		
70.983	1	562.98			
71.156	10	562.66			
71.210	10b	562.56		P_{23}5	P_2 6]
71.437	2	562.15		P_2 15	
71.803	1	561.47			
71.871	7	561.35		P_2 7	
71.956	2	561.19			
72.008	10b	561.10	Q_{12}8	P_{23}6	
72.122	[illegible]	560.89		P_2 14	
72.220	1	560.71			
72.315	1	560.53			
72.395	5	560.38		P_2 8	

λ	I	ν	Classification 5-3		
7372.474	8	13 560.24		O_{23}3	
72.543	3	560.11		P_2 13	
72.664	10bb	559.89	Q_1 8	P_{23}7	
72.742	7	559.74		P_2 9	
72.844	4	559.56		P_2 12	
72.935	4	559.39		P_{23}14	
72.973	7	559.32		P_2 10	P_2 11]
73.049	3	559.18			
73.096	10	559.09	R_1 3		
73.178	9	558.94		P_{23}8	
73.310	4	558.70		P_{23}13	
73.402	1	558.53			
73.477	2	558.39			
73.531	10	558.29		P_{23}9	
73.610	4	558.15		P_{23}12	
73.737	9bd	557.92		P_{23}10	P_{23}11]
73.919	1d	557.58			
74.059	9	557.32	Q_{12}7		
74.403	1	556.69			
74.564	1	556.40			
74.658	10	556.22			
74.713	10b	556.12	Q_1 7		
75.163	8	555.29		O_{23}4	
75.429	1	554.80			
75.732	1	554.25			
7[illegible].016	8	553.73	Q_{12}6		
76.125	1	553.53			
76.233	1	553.33			
76.301	9	553.20	R_1 2		
76.426	1	552.97			
76.511	1	552.82			
76.592	3	552.67			
76.647	10b	552.57	Q_1 6		
77.568	2	550.87	P_1 17		
77.690	2	550.65			
77.744	10b	550.55		O_{23}5	
77.820	1	550.41			
77.097	10b	550.27	Q_{12}5		
78.073	1	549.95			
78.308	1	549.52			
78.517	10bb	549.13	Q_1 5		
78.952	1d	548.33	P_1 16		
79.387	2	547.53			
79.433	10	547.45	R_1 1		
79.545	1	547.24	P_{12}15		
79.645	1	547.06			
79.713	8	546.94	Q_{12}4		
79.998	1d	546.41			
80.127	1	546.18			
80.191	9	546.06	P_1 15	O_{23}6	
80.261	2	545.93			
80.320	10b	545.82	Q_1 4		
80.666	1	545.19	P_{12}14		
81.334	3	543.96	P_1 14		
81.408	2	543.83			

λ	I	ν	Classification 5-3		
7381.468	10	13 543.72	Q_{12}3		
81.549	1	543.57			
81.615	1	543.45			
81.685	5	543.32	P_{12}13		
81.819	1	543.07			
81.914	1	542.90			
81.981	2	542.77			
82.054	10bb	542.64	Q_1 3		
82.217	1	542.34			
82.341	7	542.[illegible]	P_1 13		
82.444	8	541.92	R_1 0		
82.491	10	541.84		O_{23}7	
82.577	3	541.69	P_{12}12		
83.040	1	540.83			
83.163	7	540.61	Q_{12}2		
83.238	6	540.47	P_1 12		
83.365	9	540.24	P_{12}11		
83.57[illegible]	1	539.85			
83.664	2	539.69			
83.723	10b	539.58	Q_1 2		
83.850	1	539.35			
83.956	2	539.15			
84.023	10bb	539.03	P_{12}10	P_1 11]	
84.181	0	538.74	P_{13}11		
84.388	1	538.36			
84.576	3	538.01			
84.627	10	537.92	P_{12}9	O_{23}8	
84.700	9	537.80	P_1 10		
84.811	8	537.59	Q_{12}1	P_{13}10]	
84.942	1	537.34			
85.002	3	537.21			
85.071	2	537.11			
85.127	10	537.01	P_{12}8		
85.184	1	536.90			
85.194	3	536.[illegible]			
85.225	3	536.83			
85.263	10	536.73	P_1 9		
85.333	10b	536.66	Q_1 1		
85.414	1	536.51			
85.451	3	536.39	P_{13}9		
85.494	9	536.33			
85.540	10b	536.26	P_{13}7		
85.609	3	536.10			
85.647	1	536.05			
85.715	2	535.95			
85.770	9	535.83	P_1 8		
85.871	10b	535.64	P_{13}6	P_{13}8]	
85.926	1	535.52			
86.013	2	535.38			
86.072	2	535.25			
86.126	10	535.15	P_{13}5		
86.169	10b	535.07	P_1 7		
86.290	2	534.90			
86.351	10b	534.76	P_{12}4	P_{13}7]	

λ	I	ν	Classification 5-3		
7386.411	4	13 534.65			
86.505	10bb	534.48	$P_{12}3$	P_1 6]	
86.553	3	534.37			
86.618	10	534.27	$P_{12}2$	$O_{23}9$	
86.687	10	534.14	$P_{13}6$	$P_{12}1$]	
86.756	10	534.01	P_1 5		
86.800	10	533.94	Q_1 0		
86.877	1	533.82			
86.957	10b	533.65	$P_{13}5$	P_1 4]	
87.028	2	533.52			
87.090	10b	533.40	P_1 3		
87.191	10b	533.23	$P_{13}4$	P_1 1]	P_1 2]
87.419	0	532.81	$P_{13}3$		
88.476	6	530.87		$O_{23}10$	
89.350	1	529.27			
89.446	2	529.09			
89.496	10	529.00	$O_{12}1$		
90.156	8	527.79		$O_{23}11$	
90.918	1	526.40			
90.971	10	526.30	$O_{12}2$		
91.499	1	525.33			
91.671	3	525.02		$O_{23}12$	
91.809	1	524.77			
92.012	2	524.40	$O_{13}2$		
92.176	1	524.09			
92.332	3	523.81	$N_{13}2$		
92.402	10b	523.68	$O_{12}3$		
92.787	1	522.97			
92.910	1	522.75			
93.015	4	522.56		$O_{23}13$	
93.190	1	522.24			
93.328	7	521.99	$O_{13}3$		
93.743	1	521.23			
93.793	10	521.13	$O_{12}4$		
94.190	1d	520.41		$O_{23}14$	
94.658	5	519.56	$O_{13}4$		
95.075	4	518.79			
95.126	10bb	518.70	$O_{12}5$		
95.207	8	518.55	$N_{13}3$	$O_{23}15$	
95.965	8	517.16	$O_{13}5$		
96.359	1	516.45			
96.408	10	516.35	$O_{12}6$		
97.225	5	514.87	$O_{13}6$		
97.573	4	514.22			
97.628	10bb	514.14	$O_{12}7$		
97.805	1d	513.81			
98.126	4	513.22	$N_{13}4$		
98.243	1	513.01			
98.337	1	512.83			
98.434	7	512.66	$O_{13}7$		
98.598	1	512.35			
98.778	9	512.02	$O_{12}8$		
99.572	2	510.57	$O_{13}8$		
99.704	1d	510.34			
99.798	2	510.16			

λ	I	ν	Classification 5-3		Classification 4-2	
7399.848	10b	13 510.08	$O_{22}9$			
7400.549	1	508.80				
00.636	4	508.64	$O_{13}9$			
00.736	1	508.45				
00.834	7	508.28	$O_{22}10$			
00.950	1	508.06				
01.026	7	507.92	$N_{13}5$			
01.612	1	506.86	$O_{13}10$			
01.732	8	506.64	$O_{12}11$			
01.891	1	506.34				
02.524	5	505.19	$O_{12}12$	$O_{13}11$]		
02.928	1d	504.45				
03.225	5	503.91	$O_{12}13$			
03.650	0	503.14	$O_{13}12$			
03.816	1	502.83	$O_{12}14$			
03.895	5	502.69	$N_{13}6$			
04.281	2	501.99	$O_{12}15$			
04.631	1	501.35	$O_{12}16$			
05.630	1	13 499.53				
06.659	1	497.65				
06.722	7	497.54	$N_{13}7$			
09.490	3	492.49	$N_{13}8$			
11.973	1	487.97				
12.196	5	487.56	$N_{13}9$			
13.522	1	485.16				
14.836	1	482.87	$N_{13}10$			
15.551	1	481.47				
17.382	2	478.13	$N_{13}11$			
17.458	3	478.00				
17.788	1	477.39				
17.916	1	477.17				
23.649	10	466.76*				
23.939	1d	466.24				
25.349	3	463.68				$S_{32}10$
26.469	1	461.64				
27.922	2	459.01				$T_{31}6$
28.024	2	458.83				
28.493	1	457.93				
28.612	2	457.76			$S_{22}11$	
28.847	1	457.34				
29.322	2	456.48				R_3 15
29.854	6	455.51				$S_{32}9$
30.516	0	454.32				$S_{31}9$
31.405	1	452.71				
32.303	1d	451.08				$R_{32}14$
33.003	2	449.81				
33.091	1	449.65				R_3 14
33.317	5	449.25				$T_{31}5$
33.522	1	448.87				
33.729	2	448.50			$S_{21}10$	
33.870	1	448.25				
33.991	1	448.03				
34.145	5	447.75				$S_{32}8$
34.642	1	446.85				
34.814	1	446.54				$S_{31}8$

*N I line 7423.639

λ	I	ν	Classification 4-2			λ	I	ν	Classification 4-2		
7435.260	2	13 445.73		R_2 15		7452.657	10	13 414.34		S_{21} [illegible]	S_{31} 3
35.435	1	445.42				52.812	1	414.07			
35.786	1	444.78				52.974	10	413.77			R_{32} 7
35.885	2	444.60		R_{21} 15	R_{32} 13	53.632	2	412.59			R_{31} 7
36.372	1	443.72				53.797	10	412.29			R_3 7
36.678	4	443.17			R_3 13	53.957	4	412.01		R_2 10	
37.076	1	442.45				54.224	1	411.53		Q_2 18	
37.423	1	441.82				54.317	2	411.36			Q_3 16
38.217	9	440.39			S_{32} 7	54.624	5	410.81		R_{21} 10	
38.451	4	439.96			T_{31} 4	54.840	10	410.42			S_{32} 2
38.710	5	439.50		S_{21} 9		55.020	10	410.09			R_{32} 6
38.868	3	439.21			S_{31} 7	55.413	7	409.39			S_{31} 2
39.035	1	438.91				55.574	1	409.10			
39.263	1	438.50			R_{32} 12	55.675	1	408.92			R_{31} 6
39.351	1	438.34		R_2 14		55.857	9	408.59			R_3 6
40.055	3	437.07		R_{21} 14	R_3 12	56.098	1	408.32			
40.606	1	436.07				56.166	9	408.03			T_{31} 0
42.049	8	433.47			S_{32} 6	56.354	5	407.69	R_1 12		
42.154	1	433.28				56.542	5	407.36			Q_3 15
42.304	10b	433.01*				56.662	1	407.14			
42.442	5	432.76			R_{32} 11	56.799	10b	406.89			R_{32} 5
42.697	2	432.30		[R_{31} 11	S_{31} 6	56.986	10	406.56		S_{21} 5	
43.112	0	431.55			R_{31} 11	57.108	2	406.34		Q_2 17	
43.242	9	431.31		R_2 13	R_3 11	57.198	8	406.18		R_2 9	
43.327	6	431.16			T_{31} 3	57.331	10b	405.94			S_{32} 1
43.518	5	430.81		S_{21} 8		57.440	2	405.74			R_{31} 5
43.647	1	430.58				57.531	1	405.58			
43.906	2	430.11		R_{21} 13		57.655	10b	405.35			R_3 5
44.344	1	429.32				57.783	1	405.12			Q_{32} 14
44.663	1	428.75				57.855	10b	405.90		R_{21} 9	S_{31} 1
45.083	1	427.99				58.156	1	404.45			
45.416	6	427.39			R_{32} 10	58.312	10	404.17			R_{32} 4
45.637	10	426.99			S_{32} 5	58.440	1	403.91			
46.210	6	425.96			R_3 10	58.566	3	403.72			Q_3 14
46.280	6	425.83			S_{31} 5	58.685	1	403.50			
46.457	1d	425.51				58.915	3b	403.09			R_{31} 4
46.971	2	424.59		R_2 12		59.201	10	402.58			R_3 4
47.312	1	423.97				59.356	1	402.30			
47.647	2	423.37		R_{21} 12		59.538	10	401.97		[R_{32} 3	Q_{32} 13
47.747	2	423.19	R_1 14			59.820	1	401.46		Q_2 16	
47.929	8	422.86			T_{31} 2	60.149	4	400.87			R_{31} 3
48.165	10	422.43		S_{21} 7	R_{32} 9	60.270	6	400.66		R_2 8	
48.835	1	421.23			R_{31} 9	60.419	10	400.39			Q_3 13
48.975	10b	420.97		[R_3 9	S_{32} 4	60.487	10	400.27	R_1 11	[R_{32} 2	R_3 3
49.603	5	419.84			S_{31} 4	60.928	9	399.47		R_{21} 8	
49.800	1	419.49				61.039	1	399.27			R_{32} 2
50.544	6	418.15		R_2 11		61.153	10	399.07		S_{21} 4	
50.686	7	417.89			R_{32} 8	61.238	1	398.92			Q_{32} 12
50.890	1	417.52				61.540	8	398.37			R_3 2
51.217	6	416.94		R_{21} 11		61.773	1	397.96			
51.505	8	416.42			R_3 8	62.032	8	397.49			Q_3 12
51.891	2	415.72			Q_3 17	62.261	1	397.08			
52.056	10b	415.43	R_1 13		S_{32} 3	62.373	5	396.88		Q_2 15	
52.222	10	415.15			T_{31} 1	62.576	1	396.51			
52.552	1	414.53				62.652	5	396.38			Q_{32} 11

*N I line 7442.299

λ	I	ν	Classification 4-2		
7462.806	1	13 396.10			
62.977	1	395.79			
63.182	10	395.43		R_2 7	
63.308	1	395.20			
63.451	10	394.94			Q_2 11
63.583	1	394.71			
63.835	10b	394.26		R_{21}7	Q_{32}10
64.512	7	393.04	R_1 10		
64.647	9	392.80			Q_3 10
64.789	7	392.54		Q_2 14	
64.991	1	392.17			
65.163	10b	391.87		S_{21} 3	Q_{32}3
65.521	5	391.22			Q_{32}8
65.614	10	391.06			Q_3 9
65.822	5	390.69			Q_{32}4
65.921	7	390.50		R_2 6	
66.008	7	390.36			Q_{32}7
66.143	10	390.12		[Q_{32}5	Q_3 3
66.220	6	389.98			Q_{32}6
66.343	10	389.76			Q_3 8
66.578	10	389.33		R_{21}6	
66.719	9	389.10			Q_3 4
66.829	10b	388.88			Q_3 7
67.022	10bb	388.54	[Q_3 6	Q_2 13	Q_3 5
67.372	1	387.91			
67.649	1	387.41		Q_{21}13	
67.778	3	387.18		Q_{23}13	
68.190	2	386.44			
68.317	10b	386.22*			
68.423	10	386.03	R_1 9		
68.525	9	385.88		R_2 5	
69.007	10	384.98		S_{21} 2	Q_2 12]
69.143	10b	384.74		R_{21}5	
69.337	1	384.39			
69.716	2	383.71		Q_{21}12	
69.824	1	383.52		Q_{23}12	
70.196	1	382.85			
70.507	1	382.29			
70.916	10	381.56		Q_2 11	R_2 4]
71.568	10	380.39		Q_{21}11	R_{21}4]
71.710	5	380.14		Q_{23}11	
72.021	6	379.58	Q_1 15		
72.110	1	379.42			
72.237	9	379.19	R_1 8		
72.356	2	378.98			P_3 4
72.649	10b	378.46		Q_2 10	S_{21} 1]
73.204	7	377.46		R_2 3	
73.298	3	377.29		Q_{21}10	
73.433	4	377.05		Q_{23}10	
73.815	10b	376.37		R_{21}3	
73.940	1	376.15			
74.034	2	375.98			
74.177	10	375.72	Q_{12}14	Q_2 9	
74.538	8	375.08			P_3 5
74.852	8	374.51	Q_1 14	Q_{21}9	

λ	I	ν	Classification 4-2		
7474.985	8	13 374.28		Q_{23}9	
75.131	1	374.01			
75.335	4	373.65		R_2 2	
75.556	10	373.25		Q_2 8	
75.727	1	372.95			
75.904	10	372.63		R_{21}2	
75.962	10	372.53	R_1 7		
76.112	7	372.26		S_{21}0	
76.218	5	372.07		Q_{21}8	
76.375	7	371.79		Q_{23}8	
76.442	7	371.67			P_3 6
76.765	10b	371.09		Q_2 7	
76.941	2	370.78	Q_{12}13		
77.050	1	370.58			
77.305	2	370.13		R_2 1	
77.437	10	369.89		Q_{21}7	
77.605	10b	369.59	Q_1 13	Q_{23}7	
77.829	10b	369.19		R_{21}1	Q_2 6]
78.053	10	368.79			P_3 7
78.476	9	368.03		Q_{21}6	
78.655	10	367.71		Q_{23}6	
78.714	10	367.61		Q_2 5	
78.934	1	367.21			
79.354	10	366.46		Q_{21}5	
79.432	9	366.32		Q_2 4	P_3 8
79.568	10b	366.08	Q_{12}12	Q_{23}5	R_1 6]
80.011	8	365.29		Q_2 3	
80.078	8	365.17		Q_{21}4	
80.238	8	364.88	Q_1 12		
80.335	10	364.71		Q_{23}4	
80.488	10	364.44		Q_2 2	P_3 9
80.628	10	364.19		Q_{21}3	
80.971	10bb	363.57		Q_{23}3	Q_{21}2]
81.245	6	363.09		Q_{21}1	
81.326	7	362.94			P_3 10
81.515	10	362.60		Q_{23}2	
81.926	9	361.87			P_3 11
82.071	7	361.61	Q_{12}11		
82.192	10b	361.39		Q_{23}1	
82.283	5	[illegible]			P_3 12
82.357	3	361.10			P_3 14
82.430	7	360.97			P_3 13
82.740	10	360.42	Q_1 11		
83.126	10b	359.72	R_1 5		
83.905	0	358.25		P_2 2	
84.464	5	357.34	Q_{12}10		
84.968	10	356.44		P_{23}2	
85.135	10	356.14	Q_1 10	P_2 3	
86.155	10b	354.32		P_{23}3	
86.374	3	353.93		P_2 4	
86.606	10	353.52	R_1 4		
86.753	9	353.25	Q_{12}9		
86.938	2	352.92		P_2 17	
87.271	10b	352.33		P_{23}4	
87.422	10b	352.06	Q_1 9	P_2 5	

*N I line 7468.309

λ	I	ν	Classification 4-2			λ	I	ν	Classification 4-2		
7487.925	0	13 351.16		P_2 16		7600.776	7	13 328.29	P_1 12		
88.128	1	350.80				00.887	10	[illegible]28.09	P_{12}11		
88.264	10b	350.56		P_{23}5	P_2 6]	01.074	10b	327.76	Q_1 2		
88.727	5	349.73		P_2 15		01.564	10b	326.89	P_{12}10	P_1 11]	
88.951	9	349.33	Q_{12}8			01.716	1	326.62	P_{13}11		
89.010	9	349.23		P_2 7		01.893	1	326.30			
89.120	10	349.03		P_{23}6		02.154	10b	325.84	P_{12}9		
89.363	3	348.60		P_2 14		02.235	10	325.70	Q_{12}1	P_1 10]	
89.557	10	348.25	[P_2 8	P_{23}15	O_{23}3]	02.352	10	325.49	P_{13}10	C_{23}8	
89.633	10	348.12	Q_1 8			02.503	1	325.22			
89.830	10b	347.77		P_{23}7	P_2 13]	02.643	10	324.97	P_{12}8		
89.953	10	347.55		P_2 9		02.733	10	324.81	Q_1 1		
90.017	10	347.43	R_1 3			02.828	10	324.64	P_1 9		
90.111	3	347.27		P_2 12		02.935	2	324.45	P_{13}9		
90.165	7	347.17		P_2 10	P_{23}14]	03.054	10b	3[illegible].24	P_{12}7		
90.236	7	347.04		P_2 11		03.180	1	324.02			
90.378	10	346.79		P_{23}8		03.312	10	323.78	P_1 8		
90.500	1	346.57				03.388	10	323.65	P_{12}6		
90.626	6	346.35		P_{23}13		03.506		323.44	P_{13}8		
90.767	10	346.10		P_{23}9		03.638	10b	323.21	P_{12}5		
90.915	5	345.83		P_{23}12		03.723	10	323.06	P_1 7		
90.992	10	345.70		P_{23}10		03.857	10b	322.81	P_{13}7	P_{12}4]	
91.061	10	345.57	Q_{12}7	P_{23}11		04.008	10b	322.56	P_{12}3	P_1 6]	
91.586	1	344.64				04.107	10	322.38	P_{12}2	P_{12}1]	
91.716	10b	344.41	Q_1 7			04.181	10	322.25	P_{13}6		
92.399	10	343.19		C_{23}4		04.289	10	322.05	P_1 5	Q_1 0]	
92.888	1	342.32				04.471	10b	321.72	P_{13}5	O_{23}9	P_1 4]
93.083	10	341.97	Q_{12}6			04.611	10b	321.47	P_1 3	P_1 0]	
93.342	10	341.51	R_1 2			04.704	10	321.32	P_{13}4	$P_1$1,2]	
93.474	1	341.28				04.948	3	320.88	P_{13}3		
93.590	1	341.07				06.395	9	318.31		O_{23}10	
93.738	10b	340.81	Q_1 6			07.094	10b	317.08	O_{12}1		
94.330	1d	339.75	P_{12}17			08.173	10	315.16		O_{23}11	
95.026	10	338.51	Q_{12}5	P_1 17]		08.640	10	314.33	O_{12}2	O_{13}1]	
95.104	10	338.38		O_{23}5		09.723	6	312.41	O_{13}2		
95.285	1	338.05				09.780	6	312.31		O_{23}12	
95.461	1bd	337.74				09.930	1	312.04			
95.678	10b	337.35	Q_1 5			10.056	6	311.82	N_{13}2		
96.428	3	336.02	P_1 16			10.149	10	311.66	O_{12}3		
96.602	10	335.71	R_1 1			11.107	10	309.96	O_{13}3		
96.908	10	335.17	Q_{12}4			11.209	7	309.78		O_{23}13	
97.017	3	334.97	P_{12}15			11.607	10b	309.07	O_{12}4		
97.541	10b	334.04	Q_1 4			12.506	8	307.43	O_{13}4	O_{23}14	
97.670	10	333.81	P_1 15	O_{23}6		13.021	10bb	306.57	O_{12}5	N_{13}3]	
98.167	3	332.93	P_{12}14	P_1 15		13.557	2	305.6			
98.732	10	331.92	Q_{12}3			13.734	1	305.30		O_{23}15	
98.850	4	331.71	P_1 14			13.888	10	305.03	O_{13}5		
99.195	7	331.10	P_{12}13	P_1 14]		14.370	10	304.18	O_{12}6		
99.340	10b	330.84	Q_1 3			14.661	7	303.66			
99.759	7	330.10	R_1 0			15.218	8	302.68	O_{13}6		
99.876	8	329.89	P_1 13			15.461	1	302.25			
7500.090	10b	329.51	P_{12}12	O_{23}7	P_1 13]	15.662	10b	301.89	O_{12}7		
00.284	1	329.16				16.139	8	301.05	N_{13}4		
00.496	9	328.79	Q_{12}2			16.303	1	300.76			
00.656	1	323.50				16.500	9	300.41	O_{13}7		

λ	I	ν	Classification 4-2		3-1
7516.664	1	13 300.12			
26.883	10	299.73	$O_{12}8$		
17.714	5	298.26	$O_{13}8$		
17.868	1	297.99			
18.025	10b	297.71	$O_{12}9$		
18.848	6	296.25	$O_{13}9$		
18.963	1	296.05			
19.088	9	295.83	$O_{12}10$		
19.177	10	295.67	$N_{13}5$		
19.905	3	294.39	$O_{13}10$		
20.051	10	294.13	$O_{12}11$		
20.857	2	292.70	$O_{13}11$		
20.917	5	292.60	$O_{12}12$		
21.675	7	291.26	$O_{12}13$		
22.199	7	290.33	$N_{13}6$		
22.324	3	290.11	$O_{12}14$		
22.839	3	289.20	$O_{12}15$		
25.170	10	285.08	$N_{13}7$		
27.370	1	281.20			
28.080	5	279.95	$N_{13}8$		
30.936	7	274.91	$N_{13}9$		
33.711	3	270.02	$N_{13}10$		
34.913	1	267.91			
36.402	4	265.28	$N_{13}11$		
38.416	1	261.74			
39.006	1	260.70	$N_{13}12$		
39.413	1	259.99			
39.503	3	259.83			
40.200	1	258.60			
41.209	2	256.83			$T_{31}7$
41.508	1	256.30	$N_{13}13$		
44.400	2	251.20			

Gap in the measurements which contains the following band. The listing is for the P_1 1 line which coincides with the most prominent head (P_1).

λ	I	ν	band
7626.76	9	13 108.12	3-1

The O- and N-branches of the 3-1 branch are given below.

In the following region from 7628 to 7756 A the measurements are obtained from spectra with two different discharge conditions, the first (I) a low pressure discharge cooled by liquid nitrogen as for the rest of this table, the second one (I_2) an uncooled discharge at 8 mm pressure which has a higher rotational temperature.

This means that under these conditions the lines of the 2-0 band and parts of the neighboring 3-1 and 7-6 bands can be followed to much higher rotational quantum numbers (up to J = 35 instead of J = 15 for the low temperature discharge).

The weak 8-7 band which coincides with the 2-0 band has only partly been analyzed.

λ	I	I_2	ν	Classification 3-1		2-0		
7628.919		7	13 104.42		$O_{23}10$			
29.064		1	104.17					
29.257		6	103.83	$O_{13}1$				
29.583		1	103.27					
29.647		2	103.16					
30.282		2	102.87					
30.434		13	101.81					Q_3 33
30.779		7	101.22	$O_{13}1$	$O_{23}11$			
30.883		4	101.04	$O_{12}2$				
31.054		12	100.75			R_1 25		
31.399		2	100.16					
31.728		9	099.59				R_2 24	
31.870		2	099.35					
32.026		5	099.08	O_{13}[illegible]				
32.311		5	098.59	$N_{13}2$				$R_{32}23$
32.458		9	098.34	$O_{12}3$	$O_{23}12$			
32.549		9	098.18			Q_1 34		
32.670		6	097.97					P_3 45
33.011		13	097.39				Q_2 33	
33.141		12	097.17					[illegible] 23
33.458		5	096.62	$O_{13}3$				
33.713		1	096.19				$Q_{21}33$	
34.000		10	095.69	[illegible]4	$O_{23}13$			
34.193		3	095.36					
34.400		5	095.01					$S_{32}16$
34.471		5	094.89				$S_{21}17$	
34.585		2	094.69					
34.741		3	094.42					
34.939		2	094.08	$O_{13}4$				
35.102		2	093.80					
35.293		6	093.48		$O_{23}14$			
35.353		6	093.38					
35.492		8	093.14	$O_{12}5$				
35.560		3	093.02	$N_{13}3$				
35.938		10	092.38					Q_3 32
36.157		3	092.00					
36.395		3	091.59	[illegible]5				
36.510		7	091.39		$O_{23}15$			
36.644		4	091.16					
36.923		5	090.68	$O_{12}6$				
37.329		9	090.00			R_1 24		
37.504		5	089.68		$O_{23}16$			
37.626		11	089.48				R_2 23	
37.721		2	089.30					
37.801		1	089.18	$O_{13}6$				
37.869		4	089.06					$R_{32}22$
37.979		6	088.87					
38.305		11	088.32	$O_{12}7$	$O_{23}17$			
38.455		12	088.06			Q_1 33		P_3 44
38.550		4	087.89					
38.626		9	[illegible].77				Q_2 32	
38.713		8	087.62	$N_{13}4$				R_3 22
38.943		3	087.22		$O_{23}1$[illegible]			
39.004		2	087.11					
39.074		3	086.99					

λ	I	I_s	ν	Classification 3-1		2-0		
7639.166		3	13 086.84	$O_{13}7$				
39.404		8	086.43					
39.442		7	086.37		$O_{23}19$			
39.578		7	086.13	$O_{12}8$				
39.681		5	085.96					
39.776		5	085.79					
40.289		4	084.91					
40.362		5	084.78					
40.435		2	084.66	$O_{13}8$				
40.502		7	084.55					$S_{32}15$
40.592		2	084.40					
40.814	7	9	084.01	$O_{12}9$				
41.024		4	083.65				$S_{21}16$	
41.174		4	083.40					
41.274	0	13	083.23					Q_3 31
41.364		2	083.05					
41.672	2	2	082.55	$O_{13}9$				
41.946	6	9	082.08	$O_{12}10$	$N_{13}5$]			
42.453		2	081.21					
42.603	1bd	2	080.61	$O_{12}10$				
42.987	5	9	080.29	$O_{12}11$				
43.126		3	080.66					
43.261	0	6	079.83					$R_{32}21$
43.356		6	079.66				P_2 22	
43.443		12	079.52			R_1 23		
43.564	1d	1	079.31					
43.710		6	079.06					
43.828	1	3	078.86	$O_{13}11$				
43.924	2	6	078.69	$O_{12}12$				
44.065		12	078.45			[$R_{21}22$	Q_2 21	R_3 21
44.131	1	10b	078.34					P_3 43
44.209		9	078.20			Q_1 32		
44.516		5	077.68					
44.621	0	2	077.50					
44.744	3	9	077.29	$O_{12}13$				
44.919	1	1	076.99					
45.016		4	076.82					$T_{31}10$
45.120	2	1	076.65	$N_{13}6$				
45.448	1	8	076.08	$O_{12}14$				
45.587		3	075.85					
45.727		5	075.61					
45.791		5	075.50					
45.901		3	075.31					
46.033	1d	7	075.08	$O_{12}15$				
46.146		2	074.89					
46.278	0	5	074.66					
46.432	1bd	11	074.40				[$S_{32}14$	Q_3 30
46.482		4	074.32	$O_{12}16$				
46.683		5	073.97					
46.806	1bd	7	073.76	$O_{12}17$				
46.899		6	073.60					
46.960		3	073.46					
47.028		7	073.38	$O_{12}18$				
47.182		4	073.12					
47.299	0	2	072.92					

λ	I	I_2	ν	Classification 3-1	2-0		
7647.411		7	13 072.73				
47.629		2	072.36			S_{21} 15	
47.754		3	072.14				
47.861		2d	071.96				
48.240	3	3	071.31	N_{13}7			
48.675		5	070.91				
48.589	1	3	070.71				R_{32}20
48.698		2	070.53				
48.924		10	070.14				
49.031	1		069.95			R_2 21	
49.102		2	069.84				
49.303		10	069.50				
49.357		10	069.40				R_3 20
49.409	0	10	069.31		R_1 22	Q_2 30	
49.636		9	068.92			R_{21}21	P_3 42
49.782		10	068.68		Q_1 31		
49.831		10	068.59				
50.022		5	068.27				
50.192		2	067.98				
50.308		7	067.78				
50.439	0d	2	067.55				
50.590	1	2	067.29				
50.722	1	0	067.07				
50.932		2	066.71				
51.014	1	5	066.57				
51.132		4	066.37				
51.290		2	066.10	N_{13}8			
51.429		13	065.86				
51.815		2	065.20				Q_3 29
51.924	1	2	065.02				T_{31}9
52.063		4	064.78				
52.143	0	6	064.64				
52.445		4	064.13				S_{32}13
52.669		3	063.75				
52.847		2	063.44				
53.001		1	063.08				
53.178		3	062.88				
53.404	1	1	062.55				
53.503		7	062.32				
53.634	0	5	062.10			S_{21}14	R_{32}19
53.803	1	1d	061.80				
54.332	2	13b	060.91	N_{13}9			
54.485		13	060.65			R_2 20	R_3 19
54.666		6	060.34			Q_2 29	
54.940	0	7	059.87				P_3 41
55.045		5	059.69				
55.241		13	059.36				
55.420		2	059.05		Q_1 30	R_1 21]	
55.780		4	058.44				
55.914	1		058.21				
55.944		5	058.16				
56.060		4	057.96				
56.100		3	057.89				
56.152		1	057.80				
56.246		10	057.64				Q_3 28

λ	I	I_e	ν	3-1	Classification 2-0		
7656.386	1	2	13 057.40				
56.622	1		057.00				
56.679		4	056.90				
57.229	2	2	055.97	$N_{13}10$			
57.383		2	055.70				
57.666		5	055.22				$S_{32}12$
57.826		7	054.95				
57.941		2	054.75				
58.067		4	054.54				
58.353		5	054.05			[$R_{32}18$	$T_{31}8$
58.699	0	2	053.46				
58.825		2	053.25				
59.033	1	2d	052.89				
59.192		9	052.62				R_3 18
59.440		10	052.20			Q_2 28	
59.565	0	11	051.98			R_2 19	
59.701	1	7	051.75			S_{21} 13	
59.857		4	051.48				
60.084	2	6	051.10	$N_{13}11$			P_3 40
60.165	1	4	050.96			$Q_{21}28$	
60.285		8	050.76			$R_{21}19$	
60.496	1d		050.39				
60.546		14	050.31		Q_1 29		
60.753		2	049.97				
60.897	0	14	049.71		R_1 20		Q_3 27
61.138		5	049.30				
61.363		7	048.92				
61.430		8	048.81				
61.559		2	048.59				
62.023		3	047.80				
62.197		3	047.50				
62.316	1d	2	047.30				
62.719	0	2	046.61				
62.844	1d	2	046.40	$N_{13}12$			
62.990	2	9	046.15				$S_{32}11$
63.033		8	046.08				$R_{32}17$
63.222		3	045.76				
63.711		3	044.92				
63.852	1	12	044.68				R_3 17
63.918		4	044.57				
64.226		14	044.05			Q_2 27	
64.528		2	043.53				
64.632		8	043.36			R_2 18	
64.714	1	3	043.21				$T_{31}7$
64.873		5	042.94				
64.977		3	042.76			$Q_{21}27$	
65.066	1d	8	042.62				P_3 39
65.366		11	042.11			$R_{21}18$	Q_3 26
65.514		4	041.86	$N_{13}13$			
65.599	1	4	041.71			S_{21} 12	
65.681		10	041.57		Q_1 28		
65.831		2	040.31				
66.069		2	040.91				
66.452	1	12	040.26		R_1 19		
66.740		6	039.76				

λ	I	I_2	ν	Classification 2-0		
7666.832		5	13 039.62			
67.183		4	039.02			
67.310		2	038.80			
67.480	1bd	5	038.51			R_{32}16
67.676		3	037.84			
68.100	1	10	037.46			S_{32} 10
68.220		2	037.25			
68.320		9	037.08			R_3 16
68.431		2	036.89			
68.707		2	036.42			
68.849		11	036.19		Q_2 26	
68.926	1		036.05			
69.211	1d		035.57			
69.530		11	035.03		R_2 17	
69.657	0	14	034.81			Q_3 25
69.780		3	034.60			
69.874		5	034.44			P_3 38
69.962		6	034.29			
70.123		3	034.02			
70.256		8	033.79		R_{21}17	
70.658	1d	14	033.11	Q_1 27		
70.825	1	3	032.82			T_{31}6
71.087		3	032.38			
71.179	1	3	032.22			
71.276		4	032.06			
71.326	1	6	031.96		S_{21} 11	
71.751	1	8	031.25			R_{31}15
71.844		9	031.09	R_1 18		
71.886		9	031.02			
71.993		4	030.84			
72.142		2	030.59			
72.451		1	030.06			R_{31}15
72.592	1	11	029.82			R_1 15
72.983	2	9	'39.16			S_{32}9
73.175		3	028.83			
73.305		13	028.61		Q_2 25	
73.709	0		027.92			S_{21} 9
73.765		11	027.83			Q_1 24
73.886		3	027.63			
74.022		3	027.40		Q_{21}25	
74.'61		3	027.16		Q_{23}25	
74.258		8	027.00		R_2 16	
74.312		4	026.90			
74.497		9	026.59			P_3 37
74.982		4	025.77		R_{21}16	
75.109		4	025.55			
75.483		11	024.92	Q_1 26		
75.609		3	024.70			
75.712		3	024.53			
75.830		4	024.33			R_{32}14
76.469		3	023.24			
76.520	1		023.15			R_{31}14
76.574		3	023.06			
76.680	2	9	022.89		[R_1 14	T_{31}5
76.788	0	3	022.70			

λ	I	I_2	ν	Classification 2-0			8-7
7676.873	1	8	13 022.53		S_{21} 10	Q_{32}23	
76.988		3	022.36				
77.092	0	12	022.19	R_2 17			
77.321		3	021.80				
77.455	0	3	021.57				
77.589		11	021.34		Q_2 24		
77.653	2		021.23			S_{32} 8	
77.696		14	021.16			Q_3 23	
77.866		3	020.87				
78.033		3	020.59				
78.211	0	6	020.29				
78.344	1	3	020.06			S_{31} 8	
78.442		3	019.90		Q_{23}24		
78.575		4	019.67				R_3 13
78.685	0	3	019.48				
78.755		3	019.37				
78.812	1	10	019.27		R_2 15		
78.951		4	019.03			P_3 36	
79.148		3	018.70				
79.270		1	018.49				
79.437		3	018.21				
79.540	0	9	018.04		P_{21}15		
79.694	1	9	017.77			R_{32}13	
79.878		3	017.46				
80.039		3	017.19				
80.156	0	14	016.99	Q_1 25			
80.293		3	016.76				
80.438		3	016.51			R_{31}13	
80.546	2	11	016.33			R_3 13	
81.449		11	014.80			Q_3 22	
81.573		3	014.59				
81.701		14	014.37		Q_2 23		
81.819		3	014.17	P_1 37			
81.944	0	8	013.96				
82.078	4	8	013.73			S_{32} 7	
82.205	0	10	013.52	R_1 16	P_2 36		
82.291	3	8	013.37		S_{21} 9	T_{31}4	
82.409	0	3	013.17		Q_{21}23		
82.546		3	012.94		Q_{23}23		
82.601	1		012.85				
82.668		3	012.73				
82.776	2	4	012.59			S_{31} 7	
82.873		3	012.39				
82.992	0	6	012.19				
83.101		3	012.00				
83.199	0	9	011.84		R_2 14		
83.245		9	011.76			P_3 35	
83.355	1	4	011.57			R_{32}12	
83.663		3	011.05				
83.921	1bd	6	010.61		R_{21}14		
84.075	0	3	010.35			R_{31}12	
84.203	2	8	010.14			R_3 12	
84.349		3	009.89				
84.487		1	009.65				
84.671	0	11	009.34	Q_1 24			

λ	I	I_s	ν	Classification 2-0			8-7
7684.819		3	13 009.09				
85.010		14	008.77			Q_3 21	
85.128	1	3	008.57				
85.279	0	1	008.31				
85.424		3d	008.07				
85.646	0	12	007.69		Q_2 22		
85.772		3	007.48				
85.860		3	007.33				
85.973		4	007.14				R_3 11
86.126		3	006.88				
86.255	3	4	006.65			S_{32} 6	
86.353		6	006.50		Q_{21} 22		
86.421	0	3	006.38	P_1 36			
86.491		3	006.26		Q_{13} 22		
86.601		8	006.08		P_2 35		
86.653	1	4c	005.99				
86.710		3	005.89				
86.795	2	8	005.75			P_{32} 11	
86.925		3	005.53				
86.956	2		005.47			S_{31} 6	
87.064	1	3	005.29				
87.180	2	12	005.10	R_1 15			
87.281	1	3	004.92				
87.348		6	004.81			P_3 34	
87.402	2	10	004.72		R_2 13		
87.500	2	4	004.55		S_{21} 8.	R_{31} 11	
87.572		3	004.43			Q_{12} 20	
87.633	4		004.33			T_{31} 3	
87.646		11	004.31			R_3 11	
87.825	1	3d	004.00				
87.991	1	3	003.72				
88.129	2	9	003.49		R_{21} 13		
88.235		3	003.31				
88.313		3	003.18				
88.385		11	003.06			Q_3 20	
88.529		3	002.82				
88.703		3	002.52				
88.762	1		002.42				
88.858		3d	002.26				
89.033	1d	14	001.96	Q_1 23			
89.171		3	001.73				
89.290		3	001.53				R_5 10
89.421		13	001.31		Q_2 21		
89.545	1	1	001.09				
89.737	1	3d	000.77				
90.012	2	6	000.30			R_{32} 10	
90.113	1	4	000.13		Q_{21} 21		
90.174	5	8c	000.03			S_{32} 5	
90.269		3	12 999.87		Q_{13} 21		
90.367	1		999.71				
90.720	1	4	999.11			R_{21} 10	
90.602		6	998.97		P_2 34		
90.863	3	9c	998.88			S_{31} 5	
90.848		8c	998.81			R_3 10	
91.015	0	4	998.61				

λ	I	I_s	ν	Classification 2-0			8-7
7691.109		3	12 998.45				
91.193		6	998.31				
91.277	0	9	998.17			P_3 33	
91.376		3	998.00				
91.443	1	8	997.89		R_2 12		
91.570	0	14	997.61			Q_3 19	
91.718		3	997.43				
92.019	0	8	996.92	R_1 14			
92.165	1	8	996.66		R_{21} 12		
92.326	0	3	996.40				R_3 9
92.437	0	3	996.21				
92.549	4	8	996.02		S_{21} 7		
92.662	2	3	995.83			T_{31} 2	
92.819	1	3	995.56				
92.998	3	12	995.26			R_{32} 9	
93.034		12	995.20		Q_2 20		
93.147	1	3	995.01				
93.246		12	994.84	Q_1 22			
93.348		3	994.67				
93.433	1	3	994.53				
93.710	1	3	994.06		[Q_{32} 18	R_{31} 9	
93.813	4		993.88			S_{32} 4	
93.864	4c	10	993.79			R_3 9	
94.023	1	3	993.53				
94.404		3	992.89				
94.496	2		992.73			S_{31} 4	
94.562		11	992.62			Q_3 18	
94.706	1	3	992.38				
94.834		9	992.16		P_2 33		
94.940		3	991.98				
94.998	0	6	991.83			P_3 32	
95.163	1	8	991.61				R_3 8
95.299	3	9	991.38		R_2 11		
95.432	0	3d	991.15				
95.569	1	6	990.92				
95.734	3	6	990.64			R_{32} 8	
95.837		3	990.47				
95.897	1		990.37				
96.020	3	9	990.16		R_{21} 11		
96.219	1d	4	989.82				
96.341		3	989.62				
96.453	1	14	989.43		Q_2 19	R_{31} 8	
96.605	3	8	989.17			R_3 8	
96.729	2	12	988.96	R_1 13			
96.860	0	3	988.74				
97.010	1	1	988.49				
97.173	7	9	988.21			S_{32} 3	
97.283	1	14	988.03	Q_1 21			
97.353	5		987.91			T_{31} 1	
97.364		14c	987.89			Q_3 17	
97.429	3		987.78		S_{21} 6		
97.577	0	3	987.53				
97.693	1	4	987.34				R_3 7
97.840	4	6	987.09			S_{31} 3	
97.957	1	3	986.89				

λ	I	I_s	ν	Classification 2-0			8-7
7698.037		6	12 986.76				
98.115	1	3	986.62				
98.221	6	9	986.45			R_{32} 7	
98.351	1	3	986.22				
98.476		4	986.02				
98.602		9	985.80			P_3 31	
98.698		4	985.54		P_2 32		
98.847		3	985.39				
98.972	2	6	985.18		R_2 10	R_{31} 7	
99.106	6	10	984.95		[Q_{32} 16	R_3 7	Q_{32} 16
99.230		3	984.74				
99.337	0	10	984.56	P_1 33			
99.546	0	3	984.21				
99.704	7	12	983.94	[R_{21} 10	Q_2 18		
99.788	0	6	983.80				
99.863		3	983.68				
99.950	1bd	11	983.53			Q_3 16	R_3 6
7700.084	0	3	983.30				
00.219	5	4	983.07			S_{32} 2	
00.340	1	3	982.87				Q_3 14
00.442	5	6	982.70			R_{32} 6	
00.601		4	982.43				
00.737	1		982.20				
00.844	3	4	982.02			S_{31} 2	
01.036	1	3	981.70				
01.147	1		981.51			R_{31} 6	
01.215		11	981.39	Q_1 20			
01.316	1	9	981.25	R_1 12			
01.339	4		981.18			R_3 6	
01.484	1	4	980.94			Q_{32} 15	
01.675	4	4	980.63			T_{31} 0	
01.803	0	3	980.41				Q_{32} 13
01.947	1		980.16				R_3 5
02.002		3	980.07			P_3 30	
02.123	6	8	979.86		S_{21} 5		
02.224	1	3	979.69				
02.322	1	13	979.53			Q_3 15	
02.381	7	13c	979.43		P_2 31	R_{32} 5	
02.479	4	8	979.26		R_2 9		
02.624	0	6	979.02				Q_3 13
02.789	2d	13	978.74		Q_2 17		
02.955	8	6	978.47			S_{32} 1	
03.084	1	3	978.25			R_{31} 5	
03.196	5	9	978.06		R_{21} 9		
03.312	7	9	977.86	P_1 32		R_3 5	
03.418	1	3	977.68				
03.519	4	6	977.52		Q_{21} 17	S_{31} 1	
03.663	1	6	977.27		Q_{23} 17	Q_{32} 14	
03.802	0	4	977.04				
03.912	1	3	976.85				
04.024	5	6	976.66			R_{32} 4	
04.150	1	3	976.45				
04.259		6	976.27	Q_{12} 19			
04.387		4	976.05				
04.518	2	10	975.83			Q_3 14	

λ	I	I_2	ν	Classification 2-0			8-7		
7704.654		3	12 975.60						Q_3 12
04.706	1		975.51			R_{31}4			
04.786		1	975.38						
04.885	0	3	975.21				R_1 11		
04.982	5	14	975.05	Q_1 19		R_3 4			
05.099		3	974.85						
05.161	1d		974.75						Q_3 12
05.206		10	974.67			P_3 29			
05.370	8	6	974.40			R_{22}3			
05.552		3	974.09						
05.639	1		973.94						
05.690		9	973.86		Q_2 16	Q_{32}13			
05.765	4	10	973.73	R_1 11					
05.813	3c		973.65		R_2 8				
05.886		6	973.53		P_2 30				
06.022	1		973.30			R_{31}3			
06.228	1	3bd	972.96						
06.389	7	9	972.68	[Q_{21}16	[R_{32}2	R_3 3			
06.493	5	13	972.50		R_{21}8	Q_3 13			
06.650	5	4	972.24		S_{21} 4				
06.961		4bd	971.72						
07.015	1bd		971.62			R_{31}2			
07.167		10	971.37	P_1 31					
07.382	1bd	3	971.01			Q_{32}12			
07.540	3	3	970.74			R_3 2			
07.674		6	970.52						
07.823		3	970.27						
07.944		3	970.06						Q_3 10
08.065		3	969.86						
08.228	3	12	969.58		[P_3 28	Q_3 12			
08.331	1	3	969.41						Q_{32}9
08.417	2	13	969.26		Q_2 15				
08.509		3	969.11						
08.593	1d	12	968.97	Q_1 18					
08.699	1d	3	968.78						
08.795		3	968.63						
08.883	1	6	968.50			Q_{32}11			
08.950	4	6	968.37		R_2 7				
09.166		4	968.01		Q_{21}15				
09.216	1	10	967.92		P_2 29				Q_3 9
09.[illegible]3		3	967.68				R_1 10		
09.503		3	967.44						
09.552	1		967.36						
09.654	7	9	967.18		R_{21}7				
09.740	6	12	967.04			Q_3 11			Q_{32}3
09.859		3	966.84						
09.912	1		966.75						
09.943		4	966.70						
10.098	3	9	966.44	R_1 10					
10.159	1c		966.33			Q_{32}10			
10.727	1	1	965.38						Q_3 3
10.841		9	965.19	P_1 30					Q_3 7
10.875	1		965.13						
10.969		10	964.98		Q_2 14				
11.013	9	10c	964.90		S_{21} 3	Q_3 10			

λ	I	I_g	ν	Classification 2-0			8-7		
7711.085	1	10	12 964.78			P_3 27			
11.189	3	4	964.60			Q_{32}9			
11.383	1	6+d	964.28	Q_{12}17					Q_3 5
11.552	2	3d	963.99			Q_{32}3			
11.693	1d	4	963.76		Q_{31}14				
11.819	0	4	963.55		Q_{13}14				
11.934	3	4	963.35		R_2 6	Q_{32}8			
12.060	8	14	963.14	Q_1 17		Q_3 9			
12.235	2	3	962.84			Q_{31}4			
12.378	1	8	962.61		P_2 28				
12.462	3	3	962.46			Q_{32}7			
12.561	3	3	962.30			Q_3 3			
12.620	6	8	962.20		R_{21}6	Q_{32}5			
12.705	1	3	962.06			Q_{31}6			
12.841	5	8	961.83			Q_3 8			
12.961	1		961.62						
13.037		3d	961.50						
13.104	1		961.38						
13.209	4	4	961.21			Q_3 4			
13.270	1		961.10						
13.347	9	14	960.97		Q_2 13	Q_3 7			
13.451	1	3	960.80						
13.547	6	8	960.64			Q_3 5			
13.610	5c	8	960.54			Q_3 6			
13.742	1	8	960.32			P_3 26			
13.912		3	960.03						
14.060	1	4	959.78		Q_{21}13				
14.128		3	959.67						
14.204	1	6	959.54		Q_{23}13				
14.323	6	13	959.34	R_1 9	P_1 29]				
14.457	1		959.11						
14.519		4	959.01					R_{21}5	
14.596	1		958.88						
14.709	4	6	958.69		R_2 5				
14.850	1	3	958.45				Q_1 15		
14.927		8	958.32						
15.065	1		958.09						
15.104		4	958.03						
15.192	5	4	957.88		S_{21}2				
15.276		3	957.74						
15.306	1		957.68						
15.360		12	957.60	Q_1 16					
15.408	9	13c	957.51		R_{21}5				
15.530	3	10	957.31		Q_2 12				
15.659	0		957.09						
15.740		3	956.96						
15.968		4	956.58						
16.097		3	956.36						
16.221	1d	12	956.15		Q_{21}12	P_3 25			
16.406	1	4	955.84		Q_{23}12				
16.613		3	955.49						
16.778	0	3	955.22						
16.949		3	954.93	P_{12}28					
17.115		3	954.65						
17.157	1		954.58						

λ	I	I_a	ν	Classification 2-0			8-7		7-6
7717.361	3	3	12 954.25		R_2 4				
17.445	1	1	954.09						
17.542	5	12	953.93		Q_2 11				
17.684	0	9	953.70	P_1 28					
17.845	1	6	953.45	Q_{12}15			R_1 8		
17.942		3	953.26						
18.023	6	6	953.12		R_{21}4				
18.165	1	8	952.89		P_2 26				
18.274	2	6	952.71		Q_{21}11		Q_1 14		
18.428	5	8	952.44	R_1 8	Q_{23}11				
18.506		8	952.32			P_3 24			
18.583	3	14	952.19	Q_1 15					
18.772		3	951.87						
18.890		3	951.67					R_2 3	
19.017		4	951.46						
19.094	1	3	951.32						
19.183	6	6	951.18		S_{21} 1				
19.283	1	3	951.01						
19.377	5	8	950.86		Q_2 10	P_3 4			
19.498	1	3	950.65					R_{21}3	
19.661	1	3	950.38						
19.822	4	4	950.11		R_2 3				
19.978	1	3	949.85						
20.093	2		949.65		Q_{21}10				
20.141		6	949.57	P_{12}27					
20.240	2	3	949.40		Q_{23}16				
20.356	1	3	949.21						
20.467	9	8	949.02		R_{21}3				
20.603		11	948.80			P_3 23			
20.710		3	948.62						R_1 31
20.796	0	11	948.47		P_2 25				
20.871	0	11	948.34	Q_{12}14	P_1 27]				
21.026	7	11	948.09		Q_2 9				
21.187	1	1	947.81						
21.342	0	1	947.56						
21.470	0	3	947.34						
21.541		4	947.22				Q_1 13		
21.640	3	12	947.06	Q_1 14					
21.761	4	4	946.85		Q_{21}9	P_3 5			
21.902	3	6	946.62		Q_{23}9		R_1 7		
22.111	2		946.27		R_2 2				
22.239	0	3	946.06						
22.357	0	3	945.86						
22.454	9	11	945.69	R_1 7					
22.505	6	11	945.61		Q_2 8	P_3 22			
22.628	1	3	945.40						
22.742	6	4	945.21		R_{21}2				
22.837	1	1	945.05						
22.944	3	3	944.87		S_{21} 0				
23.100	1		944.61						
23.154		3	944.52	P_{12}26					
23.249	3c	8	944.36		Q_{21}8	P_3 24]			
23.295	1		944.28						
23.382	3	4	944.13		Q_{23}8				
23.521	0	3	943.91						

λ	I	I_2	ν	Classification 2-0			8-7
7723.637	1	3	12 943.70				
23.789	8	9	943.45		Q_2 7		
23.866	2	9	943.33	Q_{12}13		P_3 6	
24.008	1	3	943.09				
24.196		4	942.92				
24.219		11	942.74			P_3 21	
24.265	2bd		942.66		R_2 7		
24.397	1	3	947.41				
24.501	5	4	942.26		Q_{21}7		
24.562	5	14c	942.16	Q_1 13			
24.625	1		942.05				
24.664	5	8	941.95		Q_{23}7		Q_1 12
24.757	1		941.83				
24.832	6	6	941.71		R_{21}1		
24.919	5	6	941.56		Q_2 6		
25.048	0	3	941.35				
25.130		4	941.21				
25.322		3	940 89				
25.525	1	10	940.55		P_2 23		
25.632	6	6	940.37		Q_{21}6	P_3 7	
25.736	1	8	940.19			P_3 20	
25.815	4	6	940.06		Q_{23}6		R_1 6
25.856	6c	c	939.99		Q_2 5		
26.009	1	6	939.74	P_{12}25			
26.194	1	3	939.42				
26.297	1	3	939.26				
26.376	7	8	939.12	R_1 6			
26.462	1	3	938.98				
26.552	6	6	938.83		Q_{21}5		
26.632	3	4	938.70	Q_{12}12	Q_2 4		
26.708	2	c	938.56				
26.731	c	11	938.53	P_2 25			
26.787	8	8c	938.43		Q_{23}5	R_{21}0]	
26.902	1	3	938.24				
27.049	1	10	938.00			P_3 19	
27.136	4	3	937.85			P_3 8	
27.193	1		937.75				
27.244	3	3	937.67		Q_2 3		
27.310	2		937.56		Q_{21}4		
27.357	4	11	937.48	Q_1 12			
27.460	1	3	937.28				
27.559	5		937.14		Q_{23}4		
27.595		6	937.08		P_2 22		Q_1 11
27.620		8	937.04				
27.697	1		936.91		Q_2 2		
27.785	0	3	936.75				
27.902	5	4	936.56		Q_{21}3		
28.053		3	936.32				
28.098	1		936.24				
28.164		8	936.13			P_3 18	
28.269	8	8	935.95		Q_{23}3	Q_3 1]	
28.338	6	8	935.83		Q_{21}2	P_3 9	
28.470	1	4	935.61				
28.570	2	3	935.45		Q_{21}1		
28.699	1	4	935.24	P_{12}24			

λ	I	I_s	ν	Classification						
				2–0			8–7	7–6		
7728.776		3	12 935.10							
28.860	6	4	934.96		$Q_{21}2$					
28.956		3	934.80							Q_3 37
29.023	1		934.69							
29.072		11	934.61			P_3 17				
29.130	1		934.51							
29.184		3	934.42					Q_1 38		
29.264	3b	6	934.29			P_3 10				
29.311		6c	934.21	$Q_{12}11$						
29.432	1d	8	934.01	P_1 24						
29.536		10	933.83		P_2 21					
29.626	9	6c	933.75		$Q_{21}1$		R_1 5			
29.671		1	933.61							
29.700	1		933.55							
29.770	1c	8	933.44			P_3 16				
29.853	1	3	933.30							
29.944	4	8	933.15			P_3 11				
30.032	9	13	933.00	Q_1 11						
30.130	1	3	932.83							
30.213	9	8	932.70	R_1 5						
30.259		10c	932.62			P_3 15				
30.290	1		932.57							
30.374	2	9	932.43			P_3 12	Q_1 10			
30.445	1		932.31							
30.519	1	8	932.18			P_3 14				
30.563	3	9	932.11			P_3 13				
31.101		3	931.21							
31.227		4	931.00	$P_{12}23$						
31.272		8c	930.93		P_2 20					
31.392		4	930.73							
31.543		4	930.48							
31.619	1d		930.35							
31.866	3	3	929.93	$Q_{12}10$						
31.959		12	929.78	P_1 23						
32.081	1		929.57							
32.126		4	929.50		$P_{21}20$					
32.350		3d	929.13							
32.599	9	11	928.71	Q_1 10	$P_{21}2$					
32.692		4	928.56							
32.766	1		928.43							
32.820		10	928.33		P_2 19					
33.028	1	4	927.99		P_2 3		Q_1 9			
33.127		3	927.83							
33.297	0	3	927.54				R_1 4			
33.600	0	3	927.06	$P_{12}22$						
33.687	1	8	926.89		$P_{21}19$					
33.823	1	3	926.66							
33.941	10b	9	926.46	R_1 4	$P_{21}3$					
34.039	1		926.30							
34.101	1	3	926.19							
34.198	2	8	926.04		P_2 4	P_2 18]				
34.319	5	10	925.84	$Q_{12}9$	P_1 22]					
34.546	1	3	925.45							
34.680		3	925.23							R_3 28
34.862	1d	3	924.93							

λ	I	I_2	ν	Classification 2-0			8-7	7-6		
7735.040	10	13	12 924.63	Q_2 9	$P_{23}18$					
35.170	8	4	924.41		$P_{23}4$					
35.266	1	3	924.25							
35.353	3		924.10		P_2 5					
35.389		10	924.05		P_2 17					
35.513	1	3	923.85							
35.575		3	923.74				Q_1 8			
35.697		3	923.53							
35.816	0	7	923.33	$P_{12}21$						
35.921		1	923.16							
36.057	1d	3	922.93							
36.135		3	922.80							Q_3 36
36.249		9	922.61		$P_{23}17$					
36.285	10	9c	922.55		$P_{23}5$					
36.341	1		922.45		P_2 6					
36.390		6	922.37		P_2 16					
36.438	0	6c	922.29							
36.549	1	11	922.13	P_1 21						
36.666	4	4	921.91	$Q_{12}8$						
36.798	3	4	921.69					Q_1 37		
36.921	1		921.48				R_2 3			
36.981		3bd	921.39							
37.056	1		921.26							
37.149	4	4	921.11		P_2 7					
37.237	8	10	920.96		$P_{23}6$	P_2 16]				
37.318	1		920.82		$P_{23}16$					
37.383	9	9	920.72	Q_1 8						
37.522	1	3	920.48							
37.594		3	920.36							
37.664	10	7	920.25	R_4 3	$O_{23}3$					
37.790	2	3	920.03		P_2 8					
37.860	1	8	919.92		P_3 14					
37.958	1	4	919.75	$P_{12}20$			Q_1 7			
38.054	10	11	919.60		$P_{23}7$					
38.160	1	3	919.42							
38.265	5	4	919.24		P_2 9					
38.298		6c	919.19		P_2 13					
38.385	1		919.04							
38.451	1	3	918.93							
38.540	4		918.78		P_2 10					
38.571		9	918.73		P_2 12					
38.624		9c	918.64	P_1 20	P_2 11					
38.669	7		918.57		$P_{23}8$					
38.690		9c	918.53		$P_{23}14$					
38.774	1		918.39							
38.818		4	918.32							
38.847	1		918.27							
38.923	6	6	918.15	$Q_{12}7$						
39.034	1	3	917.96							
39.145	8	11	917.78		$P_{23}9$	$P_{23}13$]				
39.257	1	3	917.59							
39.337	1	3	917.45							
39.425	6	9	917.31		$P_{23}10$	$P_{23}12$]				
39.521	6	9	917.15		$P_{23}11$					
39.632	10	11	916.96	Q_1 7						

λ	I	I_2	ν	Classification 2-0		8-7		7-6		
7739.778	1d	8	12 916.72	$P_{12}19$						
39.924		1	916.47							
40.038	0d		916.28							
40.086		1	916.20							
40.236	1	3	915.95			Q_1 6				
40.398	0	3	915.68			R_1 2				
40.512		12	915.49	P_1 19						
40.635	1		915.28							
40.769	5	3	915.06		$Q_{23}4$					
40.894	1		914.85							
40.941	1	3	914.78							
40.985	1		914.70							
41.094	5	4	914.52	$Q_{12}6$						
41.181	1		914.37							
41.283	6	4	914.21	R_1 2						
41.414	0	3	913.99							
41.538		6	913.78	$P_{12}18$						
41.653	[illegible]	3	913.59							
41.797	10	10	913.35	Q_1 6						R_3 27
41.894	1		913.18							
42.001		3	913.01							
42.126		3	912.80							
42.270	0	9	912.56	P_1 18						
42.424	0	3	912.30			Q_1 5				
42.565		3	912.07							
42.898		3	911.51							
43.030		3	911.29							
43.140		8	911.11	$P_{12}17$						
43.186	8	8c	911.03	$Q_{12}5$						Q_1 35
43.293	1		910.85							
43.367		3	910.73							
43.447	1d		910.59							
43.565		3	910.40							
43.632	1		910.29							
43.752	8	4	910.09		$Q_{23}5$					
43.815	1		909.98			R_1 1				
43.879	10b	14	909.87	Q_1 5	P_1 17]					
44.078	0	4	909.55					R_1 26		
44.214		3	909.32					Q_1 36		
44.504	0	3	908.83			Q_1 4				
44.611	1	6	908.66	$P_{12}16$						
44.717	0	3	908.47							
44.830	8	4	908.29	R_1 1						
44.925	1		908.13							
45.010	1		907.99							
45.118	1		907.81							
45.200	5	3	907.67	$Q_{12}4$						
45.336	1	9	907.45	P_1 16						
45.481	0	3	907.21							
45.588	0	1	907.03							
45.762	1	3	906.73							
45.885	10	8	906.53	Q_1 4						
45.922		10c	906.47	$P_{12}15$						
46.060	1		906.24							
46.114		4	906.15							

λ	I	I_2	ν	Classification 2-0		8-7		7-6		
7746.259	1d	1	12 905.91							
46.415		3	905.65							
46.484	1		905.53			Q_1 3				
46.575	5	3	905.38		O_{23}6					
46.661	2	11	905.24	P_1 15		P_1 11				
46.814		3	904.99							
46.972	1	3	904.72							
47.034	1	6	904.51	P_{12}14						
47.167	8	4	904.40	Q_{12}3						
47.385	1	3	901.03							
47.671	1	3	903.56			P_1 10				
47.827	10	11	903.30	Q_1 3	P_1 14]					
47.926		3	903.13							
47.956	1		903.08							
48.050	1	3	902.93							
48.153	3	10	902.76	P_{12}13						
48.266	4	3	902.57	R_1 0						
48.363	0		902.40			Q_1 2				
48.454		1	902.25							
48.617	1	3	901.98			P_1 9				
48.697	1		901.85							
48.752		4	901.76							R_3 26
48.789	1		901.69							
48.885	5	11	901.53	P_1 13						
48.981	1	3	901.38							
49.071	6	8	901.23	P_{12}12	Q_{12}2]					
49.162	1	3	901.07							
49.250	8	6	900.93		O_{23}7					
49.399	1	4	900.66			P_1 8				
49.517		3	900.48							
49.591	1	3	900.36							
49.697	9	6	900.19	Q_1 2						
49.808	3	8	900.00	P_1 12						
49.881	6	9	899.87	P_{12}11						
49.993	0	4	899.69							Q_3 34
50.102	1	3	899.51			Q_1 1	P_1 7]			
50.314	0	3	899.16							
50.418	1d		898.98							
50.468		3	898.90							
50.563	4	4	898.74	P_{12}10						
50.609	6	11	898.66	P_1 11						
50.743	1		898.44	P_{13}11						
50.783		3	898.38							
50.844	1		898.27							
50.919	5	1	898.15	Q_{12}1						
51.043	1	3	897.94							
51.150	9	10	897.76	P_{12}9		P_1 5				
51.228	1	3	897.64							
51.298	6	8	897.52	P_1 10						
51.361	1		897.41							
51.427	1	4	897.30	P_{13}10				Q_1 35		
51.493	10	8	897.20	Q_1 1		P_1 4				
51.571	1		897.06							
51.639	7	8	896.95	P_{12}8						
51.705	1		896.84			Q_1 0				

λ	I	I_2	ν	Classification 2-0		8-7		7-6		
7751.754	5	4	12 896.76		O_{23}8	P_1 3				
51.817	1	3	896.65							
51.879	9	10	896.55	P_1 9						
51.951	1	3	896.43			P_1 2				
52.039	10	10	896.29	P_{12}7	P_{13}9]	P_1 1				
52.157	1		896.09							
52.252	2	2d	895.93							
52.359	10	10	895.75	P_1 8	P_{12}6]					
52.501	1	3	895.52	P_{13}8						
52.607	10	9	895.34	P_{12}5						
52.682	1	3	895.21							
52.751	10	9	895.10	P_1 7						
52.799	10c	9c	895.02	P_{12}4						
52.877	1		894.89							
52.940	10	8	894.78	P_{12}3	P_{13}7]					
53.040	9	6	894.62	P_1 6	P_{12}2]					
53.091	9c	8c	894.55	P_{12}1						
53.172	6	4	894.40	Q_1 0						
53.244	1		894.28	P_{13}6						
53.306	10	8	894.18	P_1 5						
53.376	1		894.06							
53.431	1		893.97							
53.486	8	4	893.88	P_1 4						
53.548	2		893.78	P_{13}5	P_1 0]					
53.596	9	6	893.70	P_1 3						
53.670	9	6	893.57	P_1 2	P_1 1]					
53.774	1	1	893.40	P_{13}4						
53.872	1	1	893.24							
53.981	2	2	893.07	P_{13}3						
54.100	7	8	892.86		O_{23}9					
54.223	0	1	892.66	P_{13}2						
54.429	0	1d	892.31							
54.511		0	892.18			O_{12}1				
54.676		1bd	891.90	P_{13}1						
54.731	1d		891.81							
54.815		2	891.67							
55.145		1	891.12							
55.190		1	891.05							
55.331		1	890.81							
55.423	1	2	890.66							
55.495		4	890.54							R_3 25
55.659		1	890.27							
55.800		2d	890.03							
56.022		1d	889.67			O_{12}2				
56.059	1		889.60							
56.164	1		889.43							
56.259	9	7	889.27	O_{12}1	O_{23}10					
56.386	1	1	889.06							
56.523		1	888.83							
56.610		5	888.69							O_3 33
56.706		1	888.53							
56.792		1	888.39							
56.967		3	888.09							
57.053		1	887.95							
57.301		2	887.44							

λ	I	I_2	ν	Classification 2-0		8-7		7-6		
7757.469	1d	2	12 887.26			$O_{12}3$				
57.620		2	887.01							
57.687		2c	886.90							
57.728	0		886.83	$O_{13}1$						
57.771		1	886.76							
57.849	1	1	886.63							
57.959	7	3	886.45	$O_{12}2$						
58.088	1	1	886.23							
58.163	1		886.11							
58.246	5	8	885.97		$O_{23}11$					
58.432	1	3	885.58					Q_1 34		
58.635		2	885.32							
58.758	1d		885.12							
58.795		3	885.06			$O_{12}4$		R_3 26		
59.001	1		884.71							
59.128	2	1	884.50	$O_{13}2$						
59.348		3	884.14							
59.380	1		884.08	$N_{13}2$						
59.450		1	884.00							
59.520	2	5	883.85						Q_2 33	
59.624	10	6	883.68	$O_{12}3$						
59.752		3	883.47							
59.823	1		883.35							
59.883		1	883.25							
59.922	1		883.18							
60.050	3	6	882.9[illegible]		$O_{23}12$	$O_{12}5$				
60.291		1	882.[illegible]							
60.380	0	2	882.[illegible]							
60.473		1	882.[illegible]							
60.564	1	1	882.[illegible]							
60.653	5	2	881.97	$O_{13}3$						
60.813	1	2	881.71							
61.018		2d	881.37							
61.067		3bd	881.29							
61.103	1	1	881.22							
61.238	8	5	881.00	$O_{12}4$		$O_{12}6$				
61.437	1	1	880.67							
61.504		1	880.56							
61.558	1		880.47							
61.666	3	8	880.29		$O_{23}13$					
61.785		1	880.10							
61.816	1		880.04							
61.934		1	879.85							
62.055	1	2	879.65							R_3 24
62.128		1	879.53							
62.210	3	2	879.39	$O_{13}4$						
62.308	1	2	879.23			$O_{12}7$				
62.432		1	879.02							
62.486	1		878.93							
62.539		3	878.85							
62.664		2	878.64							
62.727	1		878.53							
62.816	10	8	878.38	$O_{12}5$	$N_{13}3$]					
62.936		1	878.19							
63.021		3	878.04							Q_3 32

λ	I	I_s	ν	Classification 2-0		8-7		7-6	
7763.100	1	4	12 877.91		$O_{23}14$				
63.188		1	877.77			$O_{13}7$			
63.279		2	877.62			$O_{12}8$			
63.311	1	.	877.56						
63.387		1	877.44						
63.604	1		877.07						
63.643		1	877.01						
63.752	5	3	876.83	$O_{13}5$					
63.853	0	2	876.66						
63.978		3	876.46						
64.074	1	3	876.29						
64.121		3c	876.22			$O_{12}9$			
64.226	0	1	876.05						
64.335	8	9	875.86	$O_{12}6$	$O_{23}15$				
64.469	1	0	875.64						
64.608		1	875.41						
64.756		1	875.17						
64.866	1d	1	874.98			$O_{12}10$			
64.987		3	874.78						
65.037		2c	874.70						
65.085	1		874.62						
65.170		2	874.48						
65.249	3	2	874.35	$O_{13}6$					
65.351		5	874.18					Q_1 33	
65.399	1	4	874.10		$O_{23}16$				
65.461		2c	874.00			$O_{12}11$			
65.564		1	873.83						
65.621	1	-	873.74						
65.652		1	873.68						
65.782	10	8	873.47	$O_{12}7$					
65.910		4b	873.26					R_1 25	
65.984	1		873.13						
66.066		4	872.99						Q_2 31
66.200	3	2	872.77	$N_{13}4$					
66.289	1	8	872.62		$O_{23}17$				
66.386		1	872.46						
66.484		2	872.30						
66.552	1		872.19						
66.597		1	872.11						
66.687	4		871.96	$O_{13}7$					
66.703		5	871.94		$O_{23}25$				
66.798		3	871.78						
66.908	0	1	871.61						
66.990		4	871.46		$O_{23}18$				
67.067		1	871.34						
67.160	6	6	871.18	$O_{12}8$					
67.289		3	870.97						
67.341		2	870.88		$O_{23}24$				
67.408		1	870.77						
67.503		7	870.61		$O_{23}19$				
67.609	0	1	870.44						
67.708		4	870.27		$O_{23}23$				
67.828		4	870.08		$O_{23}20$				
67.925		2	869.92		$O_{23}22$				
67.964		6	869.85		$O_{23}21$				

λ	I	I_s	ν	Classification 2-0		7-6		
7768.058	2	1	12 869.70	$O_{13}8$				
68.151		2	869.54	$O_{12}27$				
68.271	1	1	869.34					
68.394		4	869.13					R_3 23
68.466	9	8	869.02	$O_{12}9$				
68.642		1	868.73					
68.827		2	868.42					
68.935		1	868.24					
69.044		2	868.06					
69.151		1	867.88					
69.193	1		867.81					
69.247		6	867.72					Q_3 31
69.351	3	3	867.55	$O_{13}9$				
69.459	1	1	867.37					
69.562	4	3	867.20	$N_{13}5$				
69.677	4	6	867.01	$O_{12}10$				
69.922		1d	866.61					
70.044	0	2	866.40					
70.227		2d	866.10					
70.396	1	4	865.82					
70.556	2	1	865.55	$O_{13}10$				
70.612		3	865.46	$O_{12}27$				
70.789	5	9	865.17	$O_{12}11$				
70.961	1	1	864.88					
71.099		1	864.66					
71.208		2	864.48					
71.262		1c	864.39					
71.445		1	864.09					
71.583		3	863.86					
71.672	2	3	863.70	$O_{13}11$				
71.802	3	6	863.49	$O_{12}12$				
71.920		1	863.30					
71.958	2		863.23					
72.039		4	863.10			Q_1 32		
72.104	1		862.99					
72.254	1bd	2bd	862.74					
72.409		6	862.49				Q_2 31	
72.508		2	862.33					
72.599		4	862.17	$O_{12}25$				
72.690	3	8	862.02	$O_{12}13$	$O_{13}12]$			
72.783	1		861.87					
72.833		2	861.79			R_1 24		
72.887	3	2c	861.70	$N_{13}6$				
73.061	1	1bd	861.41					
73.312	1	4	861.00					
73.465	2	6	860.74	$O_{12}14$	$O_{12}24]$			
74.562		3	860.58	$O_{13}13$				
73.529	1		860.53					
73.669		1	860.40					
73.789		3	860.21					
73.840	1d		860.12					
74.021		2	859.82					
74.116	2	9	859.67	$O_{12}15$				
74.220		1	859.49					
74.332	0	1	859.31	$O_{13}14$				

λ	I	I_2	ν	Classification 2-0		7-6		
7774.439		1	12 859.13					
74.553	0	3	858.94					R_3 22
74.628		5	858.82	$O_{12}16$				
74.669		4c	858.75	$O_{12}22$				
74.863		2	858.43					
74.996	1d	8	858.21	$O_{12}17$	$O_{13}15$]			
75.041		7	858.13	$O_{12}21$				
75.131		1	857.98					
75.249		7	857.79	$O_{12}18$	$O_{12}20$]			Q_3 30
75.328		6	857.66	$O_{12}19$				
75.319		7	857.51					
75.455		2	857.43					
75.611		1	857.19					
75.734		1	856.99					
75.830		2	856.83					
76.030		1	856.50					
76.172	4	3	856.27	$N_{13}7$				
76.319		1	856.02					
76.557	0	1	855.62					
76.702	1	1	855.38					
76.805		1	855.22					
76.879		1	855.10					
76.954		2	854.97					
77.372		1	854.28					
77.497		1	854.07					
77.652		3	853.82					
78.060		1	853.14					
78.192		0	852.93					
78.544		7	852.34			Q_1 31	Q_2 30	
78.648		1	852.17					
78.739		2	852.02					
79.259	1	1	851.17					
79.411	2	2	850.91	$N_{13}8$				
79.589		5	850.62			R_2 23		
79.656	1	3	850.51					$R_{32}21$
80.022		1	849.90					
80.192		2	849.62					
80.353		1	849.36					
80.495		4	849.12					R_3 21
80.637		1	848.89					
80.789		1	848.64					
80.966		1	848.34					
81.092		6	848.14					Q_3 29
81.235		1	847.90					
81.377		1	847.67					
81.576		2	847.34					
81.902		2	846.80					
82.438		1	845.92					
82.565	3	2	845.70	$N_{13}9$				
82.671		1	845.53					
82.972	1	1	845.03			ǂ		
83.085		3	844.85					
83.314		2	844.47					
83.402	0	1	844.32					
83.679		2	843.87					

ǂ Lines marked thus have been classified as belonging to the n+4 → 3 band of the $Y^3\Sigma \to B^3\Pi$ system

λ	I	I_2	ν	Classification 2-0		7-6		
7784.052		1	12 843.25					
84.170		2	843.06					
84.382		1	842.71					
84.518		6	842.48				Q_2 29	
84.643		2	842.28					
84.765		1	842.08					
84.872		4	841.90			Q_1 30		
85.263		1d	841.25					
85.410	1d	1d	841.01			#		R_{32}20
85.656	2d	2	840.61	N_{13}10				
85.787		4	840.39				R_2 21	
85.858	1		840.27					
85.926		1	840.16					
86.043		1	839.97					
86.176		3	839.75			R_1 22		
86.242		3	839.64					R_3 20
86.316		1	839.52					
86.400	0	3	839.38					
86.503		2	839.21					
86.632		1	839.00					
86.705		4	838.87					Q_3 28
86.924	1	1	838.51					
87.031		2	838.34					
87.205		3	838.05					
87.451	1	1	837.64					
87.588	2	1	837.42			#		
87.644		1	837.33					
87.787		2	837.09					
87.916	1	2	836.88			#		
88.083	1	1	836.60			#		
88.212		1	836.39					
88.398		1bd	836.08					
88.503	1d		835.91					
88.562		1	835.81					
88.653	2	2	835.66	N_{13}11				
88.731	2		835.53			#		
88.776		2	835.46					
88.918		1	835.23					
89.017		2	835.06					
89.087	1		834.95			#		
89.325		1	834.56					
89.548	1		834.19			#		
89.893		1	833.62					
89.938	1	-	833.52					
90.131		2	833.23					
90.290		5	832.96				Q_2 28	
90.407		1	832.77					
90.502	1	4	832.62			#		
90.610	1		832.44			#		
90.744		1	832.22					
90.820	1	1	832.10					
90.919	2	2	831.93			#		R_{32}19
91.014		6	831.78			Q_1 29		
91.171	1	2	831.52					
91.547		1	830.90	N_{13}12				

λ	I	I_s	ν	Classification 2-0	Classification 7-6		
7791.640		1	12 830.74				
91.716		3	830.62		f	R_2 20	
91.760		5	830.54				R_3 19
91.892		1	830.33				
91.985		2	830.17				
92.133		6	929.93				Q_3 27
92.282		2	829.69				
92.440		2	829.43				
92.560	2		829.23				
92.595		5	829.17		R_1 21		
92.693		1	829.01				
92.801		1	828.83				
92.888		2	828.69				
93.073		[illegible]	828.38				
93.111	3		828.32		f		
93.308		1	828.00				
93.351	1		827.93				
93.518	2	0	827.65				
93.723		1bd	827.31				
94.004		1	826.85				
94.124		1	826.65				
94.181	1		826.56				
94.245		1	826.46				
94.281	1		826.40				
94.375	1	2	826.24	N_{13}13			
94.477		2	826.07				
94.650	3	1	825.79		f		
94.760		3	825.61				
94.922		3	825.34				
95.137		1	824.98				
95.554	1	1bd	824.30				
95.656		1	824.13				
95.720	0	1bd	824.03				
95.870		6	823.79			Q_2 27	
95.988		1	823.59				
96.255		2	823.15				R_{32}18
96.509	2	1	822.73		f		
96.606		3	822.57				
96.656		2	822.49				
96.822		1	822.22				
96.902	3		822.08		f		
96.971		4	921.97		Q_1 28		
97.087		3	821.78				R_3 18
97.185		1	821.62				
97.350		5	821.35				Q_3 26
97.481		4	821.13			Q_2 19	
97.818		1	820.58				
97.997	1	1	820.28				
98.095		2	820.12				
98.180		2	819.98				
98.265		3	819.84				
98.443		2	819.55				
98.529	0d		819.41				
98.621		1	819.26				
98.745		1	819.05				

λ	I	I_s	ν	Classification 7-6			λ	I	I_s	ν	Classification 7-6		
7798.842		3	12 818.89	R_1 20			7807.283		4	12 805.20			Q_3 24
98.923	2	1	818.76				07.229		2c	805.13			
99.064	1		818.53				07.299		1	805.02			
99.112		1	818.45				07.402		2	804.84			
99.303	5	1	818.14	#			07.653	3	1bd	804.59	#		
99.618		1	817.62				07.662		2	804.41			
99.906		1	817.15				08.213	0d	1	803.52	#		
7800.046		1	816.92				08.359		6	803.26	Q_1 26		
00.182		1	816.69				08.403	0	5c	803.19		R_2 17	
00.305		2	816.49				08.530		1	802.99	#		
00.426	2	1	816.29	#			08.637	3d		802.81	#		
00.579	0	1	816.04				08.757	2	0	802.61	#		
00.832		2	815.63				08.881	1		802.41			
01.061		1	815.25				08.981	1	0	802.25	#		
01.246	0	4	814.94		Q_2 26		09.122		4	802.02		R_{21}17	
01.356		2	814.76			R_{32}17	09.239		1	801.83			
01.516		1	814.50				09.276	1bd		801.77			
01.643		2	814.29				09.337		4	801.67			S_{32}10
01.897	2	2d	813.87	#			09.434	3	1	801.51	#		
02.065		1	813.60				09.665	1bd		801.13			
02.202		5	813.38			R_3 17	09.729		1	801.02			
02.280		1	813.25				10.197		1	800.26			
02.371		6	813.10			Q_3 25	10.267	1d		800.14	#		
02.476		1	812.92				10.421	0	1	799.89			
02.560		4	812.75	P_1 37			10.826	3	0	799.39			
02.673		1	812.60				10.810		5	799.25	R_1 18		
02.761		6	812.46	Q_1 27			10.916		2	799.08			R_{32}15
02.892		1	812.24				11.333		3	798.40			
03.038		2	812.00		R_2 18		11.397	2		798.29	#		
03.191		1	811.75				11.445		4	798.21		Q_2 24	
03.408	1	2	811.40				11.632		1	797.91			
03.621		1	811.05				11.772		9	797.68		[R_3 15	Q_3 23
03.724	1		810.88	#			11.875		1	797.51			
03.760		2	810.82				11.981		1	797.34			
03.880		2	810.62				12.148		1d	797.06			
04.005		2	810.42			S_{32}11	12.552		1	796.40			
04.194		1	810.11				12.885		1	795.86			
04.278	1		809.97	#			13.008		3	795.65			
04.378		2	809.80				13.203	1	0	795.33	#		
04.501	1		809.60	#			13.473		1d	794.89			
04.612		1	809.42				13.577		2	794.72		R_2 16	
04.676	5	1	809.31	#			13.696		2	794.53			
04.919		5	808.92	R_1 19			13.791		9	794.37	Q_1 25		
05.048		1	808.70				13.912		3	794.17	P_1 35		
05.279		1	808.32				14.236	1		793.64	#		
05.488		1	807.98				14.279		2d	793.57			
05.641		3	807.73				14.401		2	793.37			S_{32}9
05.788		1bd	807.49				14.580		2	793.08			
06.034		1d	807.07				14.818		1	792.69			
06.218		2	806.77			R_{32}16	14.929	1bd	1	792.51			
06.443	1	7	805.41		Q_2 25		15.126		2	792.18			
06.615		1	806.13				15.162	2		792.13	#		
06.737		2	805.93				15.244		1	791.99			
06.856		1	805.72				15.334		2	791.84			Q_{32}22
07.078		2	805.36			R_3 16	15.523		1	791.53			

λ	I	I_2	ν	Classification 7-6		
7815.626		1	12 791.37			
15.715		3	791.22			
15.820		1	791.05			
15.921	2	2d	790.89			
16.070	1	1	790.64	#		
16.173		6	790.47			Q_3 22
16.244		7	790.35		Q_2 23	R_3 14
16.457		1	790.01			
16.513	0bd		789.91			
16.563		6	789.83	R_1 17		
16.664		1	789.67			
16.926	2bd		789.24	#		
17.103		1	788.95			
17.290		1	788.64			
17.710		1d	787.96			
17.846	6	2	787.73	#		
17.979		1	787.52			
18.049		1	787.40			
18.153	0	2	787.23			
18.280	3	1d	787.02	#		
18.442	0d	2	786.76			
18.544		4	786.59		R_2 15	
18.690		1	786.35			
18.809		2	786.16			
18.850	1		786.09			
18.911		1	785.99			T_{31}5
19.033		4	785.79	Q_1 24		
19.119		1	785.65			
19.206	2	1	785.51			S_{32}3
19.276		4	785.40	P_1 34	R_{21}15	
19.427		1	785.15			
19.485	2		785.05			Q_{32}21
19.537		3	784.97			R_{32}13
19.619		3	784.83			
19.677		2	784.74			
19.869	3b		784.43	#		
19.966		1d	784.27			
20.129		3	784.90			
20.238		1	783.82			
20.340		8	783.66			Q_3 21
20.389	0d	5c	783.58			R_3 13
20.436		2c	783.50			
20.538		1d	783.25			
20.691		2d	783.08	#		
20.742	4d		783.00			
20.840		4	782.84		Q_2 22	
21.004		1	782.57			
21.262	1d		782.15			
21.356		1	781.99			
21.481		3	781.79			
21.680		1bd	781.47	#		
22.136		3	780.72	R_1 16		
22.258	1d	1	780.52	#		
22.465	1d		780.18			
22.710	2	1	779.78	#		

λ	I	I_2	ν	Classification 7-6		
7822.797		2	12 779.64			
22.874		1	779.51			
22.977		1	779.35			
23.138	1	1	779.08			
23.308		2	778.81		R_2 14	
23.396		1	778.66			
23.492	2	2	778.51	#		
23.581		1	778.36	#		
23.625	1		778.29			
23.742	1	2	778.09			S_{12} 7
23.829		1	777.95			
23.939	1	1	777.77			
24.031	2	1	777.62	#		
24.095		7	777.52	Q_1 23		
24.205		1	777.34			
24.297		4	777.19		[$Q_3$20	R_3 12
24.367		2	777.08			
24.469		4	776.91	P_1 33		T_{31}4
24.805		1	776.36			
24.864	1		776.26			
24.962		7	776.10			
25.110		1	775.86			
25.239		7	775.65		Q_2 21	
25.347	0	1	775.48			
25.458		1	775.29			
25.630	1	1	775.01			
25.701		1	774.90			
25.796	2b	2	774.74	#		
25.959		1	774.48			
26.025		1	774.37			
26.064	1	2c	774.31			
26.139	2		774.18	#		
26.312		2	773.90			
26.406	0		773.75			
26.501	4	0	773.59	#		
26.847		1	773.03			
26.982		3	772.81			
27.035		2	772.72			
27.107		1	772.60			
27.201		3	772.45		[R_{32}11	Q_{32}19
27.266		3c	772.34			
27.414		2d	772.10			
27.545		4	771.69	R_1 15		
27.673		1	771.68			
27.792	2	1	771.48	#		
27.871		3	771.36		R_2 13	
28.013	1d		771.13			S_{12} 6
28.039		7	771.08		[Q_3 19	R_3 11
28.294	3		770.67	#		
28.431		1d	770.44			
28.598		2	770.17			
28.744		1	769.93			
28.863		1	769.74			
28.984	1	5	769.54	Q_1 22		
29.098		4	769.35			

λ	I	I_2	ν	Classification 7-6		
7829.191		1	12 769.20			
29.277		4	769.06			
29.361		1	768.93			
29.400	1		768.86	#		
29.445		5	768.79		Q_2 20	
29.626		1	768.49			
29.700		1	768.37			
29.784	3	2	768.24	#		T_{31}3
29.921	1	2d	768.02			
30.045		1	767.81			
30.151		2	767.64			
30.250		2bd	767.48			
30.546		1	766.99			
30.681		2	766.77			Q_{32}18
30.794		1	766.59			
30.971		1	766.30			
31.146		1	766.02			
31.444	2	1	765.53			
31.544		5	765.37		[R_3 10	Q_3 18
31.639		1	765.21			
31.699	1		765.11			
31.752		3	765.03			
31.878	2	1	764.82	#		
31.983	3	2	764.65			S_{32}5
32.094	1	1	764.47	#		
32.237		2	764.24		R_2 12	
32.330		1	764.05			
32.694	3	1	763.49	#		S_{31}5
32.787		3	763.34	R_1 14		
32.872		1	762.20			
32.919	1		763.13	#		
32.952		3	763.07			
33.031	1	1	762.94			
33.238		1bd	762.61			
33.371		3	762.39			
33.431	3	6	762.29		$Q_2$19	
33.551	0	3	762.10			
33.685		7	761.88	Q_1 21		
33.744	1		761.78			
33.788		1	761.71			
33.872	1	2	761.58			R_{32}9
33.998		1	761.37			Q_{23}17
34.155	1d	2	761.12		Q_{31}19	
34.275		4	760.92	P_1 31	Q_{13}19	
34.618	1	1	760.36			
34.752	3	4	760.14		[T_{31}2	R_3 9
34.839		6	760.00			Q_3 17
34.986	1	2	759.76			
35.204	4	1	759.40	#		
35.354		1	759.16			
35.523		1	758.88			
35.555	1		758.83			
35.660	3	3	758.66			S_{33}4
35.824		1	758.39			
36.040		1d	758.04			

λ	I	I_2	ν	Classification 7-6		
7836.187		1	12 757.80			
36.391	1d	3	757.47		R_2 11	S_{31}4
36.597	2		757.14			
36.647		1	757.06			
36.802	0	2	756.80			R_{32}8
36.938	0	1	756.58			
37.107	3	3	756.31	#		
37.253		4	756.07		Q_2 13	
37.314	2		755.97	#		
37.419	0	1	755.80			
37.511		1	755.65			
37.603		1	755.50			
37.685	1	2	755.36			R_3 8
37.781		4	755.21			
37.839	3		755.11	#		
37.888		6	755.04	R_1 13		Q_3 16
38.002	1	1	754.85	#		
38.127		1	754.65		Q_{23}18	
38.220		5	754.49	Q_1 20		
38.478	2	1d	754.08			
38.604		2	753.87			
38.659	1	1c	753.78	#		
38.805		2	753.54			
38.852	1		753.47			
38.892		3	753.40	P_1 30		
38.945	1	1	753.32			
39.037	4	3	753.16			S_{32}3
39.162		1	752.96			
39.279	2	2	752.77	#		
39.351	3	1	752.65			T_{31}1
39.460	3	3	752.47			R_{32}7
39.623	0	2	752.21			
39.700	2	1	752.09			S_{31}3
39.784		1	751.95			
39.821	4		751.89	#		
39.880	4	3	751.79	#		Q_{32}15
39.970		3	751.65			
40.088		1	751.46			
40.211		1	751.26			
40.287	3	2	751.13	#	R_2 10	
40.351	3	4c	751.04			R_3 7
40.521		1	750.73			
40.621	0	1	750.59			
40.735	2	6	750.41			Q_3 15
40.840		5	750.23		Q_2 17	
40.957		4	750.04			P_3 27
41.069		2	749.86			
41.129	1d		749.76	#		
41.281	1	0	749.52			
41.385	1	2	749.35			
41.540	2	2	749.10	#		
41.698		1	748.84		Q_{23}17	
41.816	3	4	748.65	#		R_{33}6
41.963		3	748.41			
41.997	1		748.35			

λ	I	I_2	ν	Classification 7-6		
7842.086	3	1	12 748.20			S_{32}2
42.332		1	747.81			
42.476		2	747.57			Q_{32}14
42.539	2		747.47			R_{31}6
42.576		8	747.41	Q_1 19		
42.704	2	1	747.20		[S_{31} 2	R_3 6
42.816		3	747.02	R_1 12		
42.899	3		746.89			
43.051	1		745.64			
43.155		1d	746.47			
43.261	1d		746.30			
43.318		7	746.20	P_1 29		Q_3 14
43.409	1d		746.06			
43.571	2	0	745.79			T_{31}0
43.717		1	745.56			
43.866	4	3	745.31			R_{32}5
43.995		1	745.10			
44.096	1	2	744.94		R_2 9	
44.137		4c	744.87			
44.234	0	4	744.72		Q_2 16	
44.331		1	744.56			
44.438		3	744.38			P_3 26
44.635	1	1	744.07			R_{31}5
44.791	9	6	743.81	[S_{21} 5	R_{21}9	$R_3$5, Q_{23}11
44.964		1	743.53			
45.107		1	743.30		Q_{23}16	
45.213	2		743.13	#		
45.344	1	0	742.91			S_{31} 1
45.494	1	2	742.67			
45.609	2		742.48			R_{32}4
45.665	2	8	742.39			Q_3 13
45.816	1	2	742.14			
46.039	0	1	741.78			
46.387	2		741.22	#		
46.485		2	741.06			
46.556	2	1c	740.94			R_3 4
46.652		1	740.79			
46.759		5	740.61	Q_1 18		
46.901	00	1	740.38			Q_{32}12
47.004	4	1	740.22			R_{32}3
47.064		3	740.12			
47.185		2	739.92			
47.302		1	739.73			
47.422		5	739.54		Q_2 15	
47.551		2	739.33	P_1 28		
47.594	1	4c	739.26	R_1 11	R_2 6	
47.688		4	739.11			
47.767	0	3	738.98			Q_3 12
47.887	1	1	738.78	#		
48.031	3	1	738.55			R_3 3
48.096	1		738.44			R_{32}2
48.151		2	738.36			
48.264		1	738.17			
48.342	2	2	738.05		R_{21}8	Q_{23}15]
48.443	1		737.88			

λ	I	I_2	ν	Classification 7-6		
7848.473		2	12 737.83			
48.564	2		737.68	#		
48.586		1	737.65			
48.667		1	737.52			
48.738		2bd	737.40			Q_{32}11
48.994		2	736.99			
49.115		4	736.79			
49.218	1		736.62			R_3 2
49.276		2	736.53		P_2 28	
49.368	1		736.38		S_{21} 4	
49.599	2	5	736.00			Q_3 11
49.741	3	0	735.77			
50.031		1	735.30	Q_{12}17		
50.167		2	735.08			
50.297	3	2	734.87	#		Q_{32}10
50.403		3	734.70		Q_2 14	
50.540		1	734.48			
50.718	2	2	734.20			
50.763		8c	734.12	Q_1 17		
50.868	1	1	733.95	#		
50.982	1	2	733.76		R_2 7	
51.168	1	3	733.46			Q_3 10
51.380	2		733.12	#		
51.595	1	5	732.77	P_1 27		Q_{32}9
51.690	4	3	732.61		R_{21}7	
51.797	2		732.44	#		
51.852		2	732.35			
52.091		1	731.96			
52.230		2	731.74	R_1 10		
52.352		1	731.54			
52.467	4	5	731.35			Q_3 9
52.580		1	731.17			
52.632	1		731.09			Q_{31}8
52.700		4	730.98		P_2 27	
52.933		1	730.60			
52.966	0		730.54			Q_{32}3
53.049		1	730.41			
53.175	0	5	730.21		Q_2 13	
53.322	1	2	729.97			Q_{32}7
53.485	2	2	729.70			Q_3 8
53.549		5	729.60			
53.601	0		729.51			Q_{32}4
53.748	4	2	729.27		S_{21} 3	Q_{32}6
53.835	1		729.14			Q_{32}5
53.862		2	729.09	Q_{12}16		
53.911		1c	729.01			
54.040	2	2	728.80		R_2 6	Q_3 3
54.132		1	728.65			
54.215	5	4	728.52			Q_3 7
54.402	2		728.22	#		
54.551	2		727.98			Q_3 4
54.609		5	727.88	Q_1 16		
54.638	4		727.83	#		Q_3 6
54.751	4	3	727.65		R_{21}6	Q_3 5
54.819	2	2	727.54			

λ	I	I_2	ν	Classification 7-6		
7855.044	2		12 727.18			
55.279	1	1	726.80			
55.354		2	726.67			
55.450	0	3	726.52	P_1 26		
55.600		1	726.28			
55.703		1	726.11			
55.747		3c*	726.04		Q_2 12	
56.720	2		724.46	R_2 9		
56.929	1		724.12			
57.060	1		723.93		R_2 5	
57.274	1		723.56			
57.626	1		723.00			
57.750	5		722.79		R_{21}5	
57.944	2		722.48		S_{21} 2	
58.103	2		722.22		Q_2 11	
58.271	1		721.95	Q_2 15		
58.495	2		721.59			
58.805	1		721.09			
59.149	1d		720.53			
59.398	3		720.13	#		
59.550	2		719.88			
59.762	1		719.50		R_2 4	
59.921	2		719.28	#		
60.2[illegible]	1		718.73		Q_2 10	
60.4[illegible]	3		718.39		R_{21}4	
60.541	2		718.28			P_3 4
61.080	1bd		717.40	R_1 8		
61.918	3		716.05		S_{21} 1	
62.062	1		715.82			
62.208	3		715.58		Q_2 9	
62.331	1		715.38		R_2 3	
62.754	1		714.70			P_3 5
62.858	1		714.53			
63.000	5		714.30		R_{21}3	
63.092	1		714.15		Q_{23}9	
63.261	1		713.83			
63.507	1		713.48			
63.952	2		712.76		Q_2 8	
64.544	1d		711.80	#		P_3 6
64.831	0		711.34		Q_{23}8	
65.150	2		710.82	Q_1 13		
65.308	5		710.57	R_1 7	R_{21}2	
65.481	2		710.29		Q_2 7	
65.631	0		710.05		S_{21} 0	
66.182	2		709.16		Q_{21}7	P_3 7
66.377	2		708.84		Q_{23}7	
66.814	1		708.13		Q_2 6	
67.428	4		707.14	[Q_{21}6	R_{21}1	
67.725	2		706.66		Q_{23}6	
68.053	3		706.13			
68.309	2		705.72			P_3 9
68.640	2		705.19		Q_{21}5	
68.877	4		704.80	[Q_1 4	Q_{23}5	P_3 10
69.120	1		704.41			
69.282	1		704.15			P_3 11

λ	I	ν	Classification 7-6		
7869.404	2	12 703.95	R_1 6		
69.558	2	703.70		Q_{21}4	
69.844	3	703.24		Q_{23}4	
70.099	1	702.83	#		
70.266	2	702.56		Q_{21}3	
70.640	[illegible]	701.96	Q_{12}11	Q_{23}3	
70.829	0d	701.65		Q_{21}2	
71.088	1d	701.23		Q_{21}1	
71.319	2	700.86		Q_{23}2	
71.398	3	700.73	Q_1 11		
72.116	4	699.58		Q_{23}1	
72.625	1	698.76			
73.389	4	697.52	R_1 5		
73.564	0	697.24	Q_{12}10		
74.297	2	696.06	Q_1 10		
74.607	2d	695.56			
74.823	2	695.21			
75.001	3	694.92		P_{23}2	
75.197	0	694.61		P_2 3	
75.420	1	694.25			
76.176	6	693.03		P_{23}3	
76.329	2	692.78	Q_{12}9		
77.056	5	691.61	Q_1 9		
77.246	5	691.31	R_1 4	P_{23}4	P_2 5]
77.549	1	690.82		P_2 13	
78.149	6	689.85		P_{23}5	
78.393	0	689.46		P_{23}13	
78.535	0	689.23		P_2 7	
78.696	1	688.97		P_2 11	
78.883	4	688.67		P_{23}6	
78.964	1	688.54	Q_{12}8	P_2 10	
79.031	1	688.43		P_2 9	
79.110	1	688.30		P_{23}12	
79.425	5	687.80		P_{23}7	
79.578	2	687.55		P_{23}11	
79.687	3	687.37	Q_1 8	P_{23}8	
79.767	3	687.24			
79.843	2	687.12		P_{23}10	O_{23}3]
79.913	3	687.01		P_{23}9	
81.029	4	685.21	R_1 3		
81.471	2	684.50	Q_{12}7		
81.748	1	684.06			
82.189	7	683.35	Q_1 7		
82.714	1	687.50		Q_{23}4	
83.854	1	680.67	Q_{12}6		
84.103	1	680.27			
84.571	4	679.51	Q_1 6		
84.696	2	679.31	R_1 2		
85.454	3	678.10		O_{23}5	
85.643	1	677.79			
86.143	3	676.99	Q_{12}5		
86.754	1	676.01			
86.840	8	675.87	Q_1 5		
88.007	2	673.99		Q_{23}6	
88.109	1	673.83	P_{12}13		

*End of the high temperature measurements

λ	I	ν	Classification 7-6		
7888.245	3	12 673.61	R_1 1		
88.321	1	673.49	$Q_{12}4$		
88.858	1	672.62	P_1 13		
88.998	6	672.40	Q_1 4		
89.503	0	671.59	$P_{12}12$		
89.735	1bd	671.22			
90.235	1	670.41	P_1 12		
90.382	6	670.18	$Q_{12}3$	$O_{23}7$	
90.708	2	669.65	$P_{12}11$		
91.055	8	669.10	Q_1 3		
91.446	2	668.47	P_1 11		
91.649	0	668.14	R_1 0		
91.792	1	667.91	$P_{12}10$		
92.380	2	666.97	$Q_{12}2$		
92.536	3	666.72	P_1 10	$O_{23}8$	
92.736	4	666.40	$P_{12}9$		
92.872	1	666.18			
93.009	4	665.96	Q_1 2		
93.463	3	665.23	P_1 9		
93.556	2	665.08	$P_{12}8$		
94.25[illegible]	7	663.96	$P_{12}7$	P_1 8]	$Q_{12}1$]
94.519	2	663.54		$O_{23}9$	
94.841	6	663.02	$P_{12}6$	Q_1 1]	
94.967	5	662.82	P_1 7		
95.181	0	662.47	$P_{13}7$		
95.310	8	662.27	$P_{12}5$		
95.543	3	661.89	P_1 6		
95.698	4	661.65	$P_{12}4$		
96.000	9	661.16	$P_{12}3$	P_1 5]	
96.209	4	660.83	$P_{12}2$		
96.360	5	660.58	P_1 4	$P_{12}1$]	
96.529	2	660.31	Q_1 0		
96.658	6	660.11	P_1 3		
96.840	3	659.82	P_1 2		
96.918	4	659.69	P_1 0	P_1 1]	
97.855	1	658.19		$O_{23}11$	
98.996	3	656.36			
99.506	3	655.54	$O_{12}1$		
7901.093	3	653.00	$O_{12}2$	$O_{13}1$]	
02.603	6	650.58	$O_{12}3$		
03.641	1	648.92	$O_{13}3$		
04.037	3	648.29	$O_{12}4$		
05.[illegible]74	6	646.15	$O_{12}5$		
05.7[illegible]5	1	645.60			
06.314	2	644.65	$O_{13}5$		
06.502	1	644.34			
06.623	3	644.15	$O_{12}6$		
07.773	5	642.31	$O_{12}7$		
08.678	1	640.87	$O_{13}7$		
08.819	2	640.64	$O_{12}8$		
09.738	3	639.17	$O_{12}9$		
10.541	1	637.89	$O_{12}10$		
11.224	2	636.80	$O_{12}11$		
11.932	1	635.67	$N_{13}5$		
15.426	2	630.09	‡		

λ	I	ν	Classification 7-6	Classification 6-5	
7917.906	1	12 626.13			
48.202	9	578.01			
61.773	1	556.57			
66.439	0d	549.21			$T_{32}5$
71.564	2	541.15			$S_{32}7$
72.097	1	540.31			
72.305	2d	539.98			$S_{31}7$
74.336	1	536.79			
75.299	0d	535.27			$R_{32}11$
75.465	2	535.01			
76.036	1	534.11			$S_{32}6$
76.197	1	533.86			R_3 11
76.761	1	532.97			$S_{31}6$
77.341	2	532.06			
77.852	2bd	531.26			$T_{32}3$
78.550	1d	530.32			
79.789	1d	528.22			R_3 10
79.904	2	528.04			
80.101	1	527.73			
80.212	4	527.55			$S_{32}5$
80.929	1	526.43			$S_{31}5$
81.147	0	526.09		$R_{21}12$	
81.398	1bd	525.69			
81.961	1bd	524.81			
82.139	3	524.53			
82.253	2	524.35			$R_{32}9$
82.521	1	523.93			
82.641	2	523.74			
83.050	1	523.10			$T_{32}2$
83.161	4	522.93		$S_{21}7$	R_3 9
83.242	1	522.80			
83.312	3	522.69			
83.716	2	522.06			
84.071	2	521.50			$S_{32}4$
84.177	1	521.33			
84.577	1bd	520.71			
84.756	1bd	520.43			$S_{31}4$
85.223	4	519.69			
85.318	1	519.54			$R_{22}8$
85.496	1	519.27		$R_{21}11$	
85.637	3	519.04			
85.854	1	518.70			
86.229	2d	518.12			R_3 8
86.463	1	517.75			
86.684	1	517.09			
87.299	1	516.44			
87.614	5	515.95			$S_{32}3$
87.785	1	515.68			
87.937	4	515.44			$T_{31}1$
88.095	4	515.19			$R_{32}7$
88.174	1	515.07			
88.303	2	514.87			$S_{31}3$
88.[illegible]75	1	514.75		$S_{21}6$	
88.864	0d	513.99		R_3 10	$R_{31}7$
89.019	4d	513.74			R_3 7

*N I line 7898.985
‡N I line 7915.419

λ	I	ν	Classification 6-5			λ	I	ν	Classification 6-5		
7989.697	1d	12 513.62				8002.453	2	12 492.74		Q_2 13	
89.329	1h	513.26				02.573	1	492.55			
89.463	4	513.05				02.679	2	492.38			Q_{32}7
89.609	2	512.82		R_{21}10		02.835	6	492.14		S_{21} 3	Q_3 8
90.558	3	511.33			R_{32}6	02.933	1	491.99			Q_{32}4
90.689	2	511.13				03.022	2	491.85			
90.811	3	510.94			S_{32}2	03.101	1	491.73			Q_{31}6
91.024	1	510.61				03.191	2	491.59			Q_{32}5
91.315	1	510.15			R_{31}6	03.264	1	491.47		R_2 6	
91.406	1	510.01				03.383	2	491.29			Q_4 3
91.491	3	509.87		[S_{31} 2	R_3 6	03.606	6	490.94			Q_3 7
91.806	2	509.38				03.928	1	490.43			Q_4 4
91.912	1	509.21				03.981	3	490.35		R_{21}6	
92.376	3	508.49				04.046	3	490.25			Q_3 6
92.710	6	507.96			R_{32}5	04.148	6	490.09			Q_3 5
92.791	1	507.84		R_2 9		04.272	2	489.90			
93.299	1	507.04				04.340	1	489.79			
93.406	4	506.88		S_{21} 5	R_{31}5	04.417	1	489.67			
93.535	2	506.67		R_{21}9		04.529	2	489.50			
93.667	8	506.47		[S_{32} 1	R_3 5	04.666	2	489.28			
93.914	1	506.08				05.097	4	488.61		Q_2 12	
94.243	2	505.57			S_{31} 1	05.819	4	487.48	R_1 9		
94.326	6	505.44				05.950	2	487.28			
94.439	1	505.26				06.168	4	486.94			
94.530	3	505.12			R_{32}4	06.249	1	486.81			
94.741	1	504.79			Q_3 13	06.333	4	486.68		R_2 5	
95.247	0	504.00			R_{31}4	06.560	1	486.33			
95.452	2	503.68				07.043	6	485.58		R_{21}5	
95.535	2	503.55			R_3 4	07.123	3	485.45			
95.999	5	502.02			R_{32}3	07.218	3	485.30		S_{21} 2	
96.306	3	302.34	R_1 11			07.451	1	484.94			
96.481	2	302.07		R_2 8		07.569	3	484.75		Q_2 11	
96.609	1	301.87				07.678	1	484.59			
96.720	0	301.69			R_{31}3	07.811	1	484.38			
96.907	1	301.40			Q_3 12	08.354	0	483.53		Q_{21}11	
97.011	2	301.24				08.549	1	483.23			
97.068	3	301.13			R_3 3	08.756	2	482.91			
97.121	2	301.07			R_{32}2	09.179	1	482.25		R_2 4	
97.231	1	300.89		R_{21}8		09.803	2	481.27		Q_2 10	
98.217	2	499.35		S_{21} 4		09.892	5	481.14		R_{21}4	
98.337	1	499.17			R_3 2	10.365	2	480.40	R_1 8		
98.819	3	498.41			Q_3 11	10.711	0	479.86		Q_{21}10	
99.169	1	497.87				10.810	1	479.72			
99.505	1bd	497.34				11.043	2	479.34			
99.688	1d	497.05				11.387	4	478.81		S_{21} 1	
99.913	5	496.70				11.822	5	478.13		Q_2 9	R_2 3]
99.978	3	496.60		R_2 7		11.977	2	477.89			
8000.148	1bd	496.34				12.315	1	477.36			
00.447	3	495.87			Q_3 10	12.442	1	477.16			
00.716	5	495.45		R_{31}7		12.541	6	477.01		R_{21}3	
00.898	0	495.16			Q_{32}9	12.583	3	476.94		Q_{21}9	P_3 5
01.139	1	494.79	R_1 10			12.741	1	476.70		Q_{21}9	
01.800	5	493.76			Q_3 9	12.841	1	476.54			
01.950	1	493.52			Q_{32}8	12.912	2	476.45			
02.311	0	492.96			Q_{32}3	13.609	3	475.35		Q_2 8	

λ	I	ν	Classification 6-5		
8013.672	2	12 475.25			
14.280	2	474.30			
14.381	0	474.14		Q_{21}8	
14.548	3	473.88		Q_{23}8	P_3 6
14.793	10	473.50	R_1 7		
14.970	4	473.23		R_{21}2	
15.216	4	472.84		Q_2 7	
15.296	1	472.72		S_{21} 0	
15.541	2	472.34			
15.748	1d	472.02			
15.895	2	471.79			
15.970	4	471.67		Q_{21}7	
16.079	1	471.50			
16.164	5	471.37		Q_{23}7	P_3 7
16.469	1	470.89			
16.5[illegible]6	3	470.70		Q_2 6	
16.726	1	470.50			
16.836	4	470.32			
17.052	1	469.99			
17.196	4	469.76		R_{21}1	
17.333	2	469.55		Q_{21}6	
17.419	1	469.42			
17.478	1	469.33			P_3 8
17.550	3	469.21		Q_{23}6	
17.691	1	468.99			
17.768	3	468.87		Q_2 5	
17.971	0d	468.56			
18.132	1	468.31	Q_1 12		
18.481	4d	467.76		Q_{21}5	P_3 9
18.674	2	467.47			
18.737	5	467.37		Q_{23}5	Q_2 4]
18.823	1	467.23			
18.948	1	467.04			
19.061	3	466.86	R_1 6		
19.143	2	466.74		R_{21}0	P 10
19.269	1	466.54			
19.411	1	466.32			P_3 13
19.506	3	466.17		Q_2 3	P_3 11
19.686	2	465.89			
19.747	4	465.80		Q_{23}4	
19.862	2	465.62			
20.019	1	465.37			
20.177	4	465.13		Q_{21}3	
20.298	2	464.94			
70.412	1	464.76			
20.569	6	464.52	Q_{13}11	Q_{23}3	
21.289	7	463.40	Q_1 11	Q_{23}2	
21.958	1	462.35			
22.102	6	462.14		Q_{23}1	
22.824	5	461.02			
23.231	7	460.38	R_1 5		
23.546	1	459.90	Q_{12}10		
23.962	3	459.25			
24.070	1	459.08			
24.311	4	458.71	Q_1 10		

λ	I	ν	Classification 6-5		
8024.679	4	12 458.14			
25.148	5	457.41		P_{23}2	
25.279	0	457.21		P_2 3	
25.437	2	456.96			
25.666	1	456.60			
25.870	2	456.29			
26.004	1	456.08			
26.267	[illegible]	455.67			
26.391	7	455.48	Q_{12}9	P_{23}3	
26.729	1	454.95			
27.181	8	454.25	Q_1 9		
27.263	4	454.09	R_1 4		
27.383	1	453.94			
27.524	6	453.72		P_{23}4	P_2 5]
28.061	1	452.89			
28.332	1	452.47		P_2 6	
28.496	8	452.21		P_{23}5	
28.681	2	451.93			
28.755	1	451.81			
28.870	1	451.63			
28.954	3	451.50		P_2 7	
29.160	1	451.18	Q_{12}8		
29.218	1	451.09		P_2 11	
29.284	5	450.99		P_{23}6	P_2 8]
29.508	6	450.64		P_2 9	P_2 10]
29.612	0	450.48		P_{23}12	
29.872	8	450.08		P_{23}7	
29.915	7	450.01	Q_1 8		
30.020	4	449.85			
30.143	3	449.66		P_{23}11	
30.248	5	449.50		O_{23}3	P_{23}8]
30.434	6	449.21		P_{23}9	P_{23}10]
30.603	1	448.95			
31.230	6	447.97	R_1 3		
31.768	4	447.14	Q_{12}7		
31.961	1	446.84			
32.1[illegible]1	4	446.59			
32.293	1	446.33			
32.517	10	445.98	Q_1 7		
32.728	1	445.65			
33.186	1	444.94			
33.287	3	444.79		O_{23}4	
33.566	3	444.35			
33.672	1	444.19			
33.025	1	443.64			
34.093	3	443.54			
34.248	2	443.30	Q_{12}6		
34.348	1	443.14			
34.603	3	442.75			
34.995	8	442.14	Q_1 6		
35.070	3	442.03	R_1 2		
35.264	1	441.72			
35.491	1	441.37			
36.177	5	440.31		O_{23}5	
36.287	1	440.14			

λ	I	ν	Classification 6-5		
8036.375	2	12 440.01			
36.481	1	439.84	P_1 15		
36.630	5	439.61	Q_{12}5		
36.915	3	439.17			
36.973	2	439.08			
37.073	1d	438.92			
37.360	10	438.48	Q_1 5		
37.429	1	438.37	P_{12}14		
38.032	1	437.44			
38.186	1	437.20	P_1 14		
38.311	1	437.01			
38.460	3	436.78			
38.645	1	436.49			
38.794	5	436.26	R_1 1		
38.886	5	436.12	Q_{12}4	O_{23}6	
38.987	4	435.96	P_{12}13		
39.097	1	435.79			
39.265	3	435.53			
39.606	7	435.01	Q_1 4		
39.741	3	434.80	P_1 13		
40.025	2	434.36			
40.109	5	434.23			
40.390	1	433.79	P_{12}12		
41.060	5	432.76	Q_{12}3		
41.159	2	432.60	P_1 12		
41.291	1	432.40			
41.392	6	432.24		O_{23}7	
41.524	1	432.04			
41.638	5	431.86	P_{12}11		
41.753	10	431.68	Q_1 3		
41.930	1	431.41			
42.063	4	431.21			
42.162	1	431.05			
42.292	1	430.85			
42.395	5	430.69	P_1 11	R_1 0]	
42.509	4	430.52			
42.634	1	430.32			
42.731	3	430.17	P_{12}10		
43.011	1	429.74			
43.145	3	429.53	Q_{12}2		
43.348	1	429.22			
43.501	4	428.98	P_1 10	O_{23}8	
43.585	1	428.85			
43.696	7	428.68	P_{12}9		
43.794	5	428.53	Q_1 2		
43.891	1	428.38			
44.448	6	427.52	P_1 9		
44.515	5	427.42	P_{12}8		
45.009	1	426.55			
45.128	3	426.47	Q_{12}1		
45.213	8	426.34	P_{12}7		
45.273	5	426.25	P_1 8		
45.529	1	425.85			
45.631	1	425.69			
45.722	8	425.55	Q_1 1		

λ	I	ν	Classification 6-5		
8045.803	8	12 425.43	P_{13}6	O_{23}9	
45.894	1	425.29			
45.967	7	425.17	P_1 7		
46.049	1	425.05			
46.134	0	424.92	P_{13}7		
46.214	1	424.79			
46.283	9	424.59	P_{13}5		
46.471	1	424.40			
46.545	5	424.28	P_1 6		
46.666	7	424.10	P_{12}4		
46.823	[illegible]	423.85			
46.961	9	423.64	P_{13}3		
47.018	8	423.55	P_1 5		
47.100	1	423.43			
47.181	5	423.30	P_{12}2		
47.247	1	423.20	P_{13}5		
47.318	6	423.09	P_{12}1		
47.387	5	422.98	P_1 4		
47.490	4	422.82	Q_1 0		
47.587	1	422.67			
47.660	7	422.56	P_1 3	O_{23}10	
47.730	1	422.45			
47.787	3	422.36			
47.840	5	422.28	P_1 2	P_1 0]	
47.910	5	422.17	P_1 1		
48.039	1	421.98	P_{13}3		
48.185	2	421.75			
48.448	0	421.34	P_{13}2		
48.906	3	420.64	P_{13}1		
49.235	1	420.13			
49.356	5	419.94		O_{23}11	
50.622	5	417.99	O_{12}1		
50.821	2	417.68		O_{23}12	
52.045	1	415.79		O_{23}13	
52.299	5	415.40	O_{12}2	O_{13}1]	
53.362	0d	413.77			
53.548	1d	413.48	O_{13}2		
53.686	2d	413.27			
53.901	8	412.93	O_{13}3		
54.064	2	412.68			
54.235	1	412.34			
54.667	1	411.72			
54.996	2	411.25	O_{23}3		
55.420	3	410.59	O_{12}4		
55.534	1	410.42			
56.423	1	409.05	O_{13}4		
56.592	1	408.79			
56.738	[illegible]	408.56			
56.851	8	408.39	O_{12}5		
57.089	1	408.02			
57.172	1	407.90	N_{13}3		
57.232	2	407.80			
57.364	1	407.60			
57.649	1	407.16			
57.775	1	406.97			

λ	I	ν	Classification 6-5		
8057.636	2	12 406.87	$O_{13}5$		
58.011	1	406.60			
58.191	6	406.33	$O_{12}6$		
58.376	1d	406.04			
58.733	1	405.49			
59.162	1	404.83	$O_{13}6$		
59.423	8	404.43	$O_{12}7$		
59.623	1	404.12			
60.365	2	402.98	$O_{13}7$		
60.550	4	402.69	$O_{12}8$		
60.970	1	402.05			
61.247	1	401.62			
61.479	1	401.27	$O_{13}8$		
61.557	6	401.15	$O_{12}9$		
62.027	1	400.42			
62.450	2	399.77	$O_{12}10$	$O_{13}9$	
62.595	1	399.55			
63.193	3	398.63	$O_{12}11$		
63.374	1	398.35	$O_{13}10$		
63.575	2	398.04			
63.759	3	397.76	$N_{13}5$	$O_{12}12]$	
63.817	1	397.67			
64.261	1	396.99	$O_{12}13$		
65.765	1	394.68			
65.920	3	394.44			
66.973	1	392.82	$N_{13}6$		
68.336	1	390.73			
68.512	1	390.46			
70.080	2	388.05	$N_{13}7$		
71.376	0	386.06			
71.532	2	385.82			
74.464	1	381.32			
75.159	2	380.26			
76.384	1	378.38			
77.925	1	376.02			
81.438	1	370.64			

λ	I	ν	Classification 1-0		
8790.336	1	11 373.01			$S_{32}11$
92.449	1	370.28			
93.653	1d	368.72			
97.410	1	363.86			$S_{32}10$
8801.197	1	358.98		$S_{21}11$	
01.668	1	358.37			$R_3 15$
04.190	3	355.11			$S_{32}9$
08.879	0	349.07		$S_{21}10$	
09.788	1	347.90			
09.926	3	347.72			$T_{31}5$
10.649	2	346.79			$S_{32}8$
11.903	1b	345.17			$R_{32}13$
13.021	3	343.74			$R_3 13$
16.325	3	339.48		$S_{21}9$	
16.762	7	338.92			$S_{32}7$
17.141	1	338.43			$R_{32}12$
17.537	2	337.93			$T_{31}4$
17.689	1	337.73			$S_{31}7$
18.250	2	337.01			$R_3 12$
20.701	1	333.86	$R_1 15$		
21.956	1	332.25		$R_2 13$	
22.021	3	332.16			$R_{32}11$
22.519	5	331.52			$S_{32}6$
22.923	1	331.00		$R_{21}13$	
23.037	1	330.86			
23.155	5	330.71			$R_3 11$
23.437	1	330.34			$S_{31}6$
23.518	2	330.24		$S_{21}8$	
24.206	1d	329.36			
24.747	6	328.66			$T_{31}3$
26.610	2	326.27			$R_{32}10$
27.549	1d	325.06	$R_1 14$		
27.669	1	324.91			
27.746	4	324.81		$R_2 12$	$R_3 10$
27.908	9	324.61			$S_{32}5$
28.661	1bd	323.64		$R_{21}12$	
28.816	4	[illegible]			$S_{31}5$
29.[illegible]	[illegible]	[illegible]			$Q_3 18$
30.[illegible]6	[illegible]	321.35		$S_{21}7$	
30.855	6	320.82			$R_{32}9$
31.544	4	319.90			$T_{31}2$
31.769	0	319.65			$R_{31}9$
31.996	7	319.36			$R_3 9$
32.909	7	318.19			$S_{32}4$
33.032	1	318.04			
33.133	3	317.91		$R_2 11$	
33.793	4	317.06			$S_{31}4$
34.085	3	316.69		$R_{21}11$	
34.155	3	316.60	$R_1 13$		
34.752	4	315.83			$R_{32}8$
35.[illegible]	0	314.63			$R_{31}8$
35.[illegible]	5	[illegible]			$R_3 8$
37.[illegible]	4	312.79		[illegible]	
37.499	10	312.32			$S_{31}3$
37.681	1	312.08			$Q_3 16$

Gap in the meas[illegible] [illegible]ons which contain the follo[illegible] [illegible]ands. The $P_1 1$ line which coincides wi[illegible] the main head (P_1) is given.

λ	I	ν	band
82[illegible].50	3	12 183.61	5-4
837[illegible].12	2	11 943.98	4-3
854[illegible].54	6	11 702.91	3-2
872[illegible].03	8	11 460.76	2-1

[illegible]he rotational structure of the 2-1 and 3-2 [illegible]ands has b[illegible] give[illegible] by C[illegible]roll (19[illegible]2).

λ	I	ν	Classification 1-0		
8837.869	8	11 311.84			T_{31}1
38.078	1bd	311.57			
38.288	9	311.32		R_2 10	R_{32}7
38.362	7	311.21			S_{31}3
39.211	1	310.12		R_{21}10	R_{31}7
39.290	2	310.02			
39.458	9	309.81			R_3 7
40.602	2	308.35	R_1 12		
41.297	3	307.46			Q_3 15
41.443	7	307.27			R_{32}6
41.653	8	307.00			S_{32}2
42.354	0	306.10			R_{31}6
42.467	3	305.96			S_{31}2
42.632	6	305.75			R_3 6
43.259	5	304.95		R_2 9	
43.554	8	304.57		S_{21}5	
43.662	6	304.43			T_{31}0
44.204	10	303.74		R_{21}9	R_{32}5
44.618	1	303.21			Q_3 14
45.129	2	302.56		Q_2 16	R_{31}5
45.234	1	302.42			
45.350	10	302.23			S_{32}1
45.419	10	302.19			R_3 5
46.098	5	301.37			S_{31}1
46.540	7	300.76		[Q_{32}13	R_{32}4
46.834	4	300.38	R_1 11		
47.597	4	299.40			Q_3 13
47.804	5	299.14			R_3 4
47.922	2	298.99		R_2 8	
48.442	9	298.33			R_{32}3
48.725	1	297.96			
48.866	3	297.76		R_{21}8	
49.077	0	297.51			Q_{32}12
49.222	1	297.33		Q_2 15	
49.311	1	297.22			R_{31}3
49.722	6	296.69		S_{21}4	
49.785	8	296.61			R_3 3
49.885	5	296.48			R_{32}2
50.273	3	295.99			Q_3 12
50.758	1	295.37			
51.405	3	294.54		[Q_{32}11	R_3 2
52.329	6	293.36		R_2 7	
52.473	1	293.18			
52.619	7	292.99			Q_3 11
52.739	1	292.84			
52.901	3	292.64	R_1 10		
53.009	2	292.50	Q_1 17	Q_2 14	
53.263	8	292.17		R_{21}7	
53.491	1	291.88			Q_{32}10
54.628	4	290.43			Q_3 10
54.792	1	290.22			
55.127	2	289.80			Q_{32}9
55.635	9	289.15		S_{21}3	
55.830	1	288.90			Q_{32}2
56.279	9	288.33			Q_3 9

λ	I	ν	Classification 1-0		
8856.397	1	11 288.18			Q_{32}8
56.469	3	288.09		R_2 6	
56.547	3	287.99		Q_2 13	
56.685	2	287.81			Q_{32}3
57.305	4	287.02			Q_{32}7
57.398	6	286.90		R_{21}6	
57.502	2	286.77			Q_{32}4
57.569	6	286.68			Q_3 8
57.682	1	286.54		Q_{21}13	
57.791	2	286.40			Q_{32}6
57.870	4	286.30			Q_{32}5
57.959	1	286.19			
58.032	5	286.09			Q_3 3
58.318	1	285.73			
58.477	10	285.53			Q_3 7
58.624	1	285.34			
58.776	9	285.14	R_1 9		Q_3 4
58.899	1	284.99			
58.988	7	284.88			Q_3 6
59.094	9	284.75			Q_3 5
59.622	1	284.07			
59.800	3	283.84		Q_2 12	
60.358	6	283.13		R_2 5	
60.485	1	282.97			
61.278	10	281.96		S_{21}2	R_{31} 5]
62.531	3	280.37	Q_1 15		
62.800	6	280.02		Q_2 11	
63.762	1	278.80		Q_{21}11	
63.935	1	278.56		Q_{23}11	
64.005	2	278.49		R_2 4	
64.496	5	277.86	R_1 8		
64.698	2	277.61			
64.894	7	277.36		R_{21}4	
65.528	4	276.55		Q_2 10	
66.482	1	275.34		Q_{21}10	
66.670	9	275.10		S_{21}1	Q_{23}10]
66.992	1	274.69	Q_1 14		P_3 4
67.385	3	274.19		R_2 3	
67.760	1	273.71			
67.997	8	273.41		Q_2 9	
68.113	1	273.26			
68.256	10	273.08		R_{21}3	
68.951	3	272.20		Q_{21}9	
69.149	3	271.95		Q_{23}9	
70.055	8	270.80	R_1 7		P_3 5
70.194	5	270.62		Q_2 8	
71.147	2	269.41		Q_{21}8	
71.243	5	269.29	Q_1 13		
71.362	8	269.14		R_{21}2	Q_{23}8]
71.726	3	268.67		S_{21}0	
72.131	8	268.16		Q_2 7	
72.698	2	267.44			P_3 6
73.074	5	266.96		Q_{21}7	
73.195	1	266.81			
73.309	6	266.66		Q_{23}7	

λ	I	ν	Classification 1-0			λ	I	ν	Classification 1-0		
8873.809	4	11 266.05		Q_2 6		8890.632	1	11 244.71		P_2 8	
74.059	1	265.71				90.897	8	244.38	R_1 3		
74.208	8	265.52		R_{21}1		90.998	5	244.25	[P_2 11	P_2 9	P_{23}13}
74.737	3	264.85		Q_{21}6		91.149	8	244.06		P_2 10	P_{23}7]
74.880	5	264.67			P_3 7	91.211	4	243.97		O_{23}3	
75.005	4	264.51		Q_{23}6		91.682	1	243.38		P_{23}12	
75.109	1	264.38				91.794	5	243.24		P_{23}8	
75.222	6	264.23		Q_2 5		92.021	5	242.95	Q_{12}7		
75.312	3	264.12	Q_1 12			92.118	3	242.83		P_{23}11	
75.463	5	263.93	R_1 6			92.174	6	242.76		P_{23}9	
76.142	5	263.07		Q_{21}5		92.283	2	242.62		P_{23}10	
76.252	1	262.93				92.815	.1	241.95			
76.383	2	262.76		Q_2 4		92.903	1	241.84			
76.450	8	262.66		Q_{23}5		92.963	10	241.76	Q_1 7		
76.641	3	262.44			P_3 8	94.509	1	239.81			
76.741	2	262.31		R_{21}0		95.088	3	239.08	Q_{12}6		
77.159	1	261.78				95.258	3	238.86		O_{23}4	
77.297	5	261.60		Q_{21}4	Q_2 3]	95.431	1	238.64	P_1 17		
77.660	5	261.14		Q_{23}4		95.804	4	238.17	R_1 2		
77.999	5	260.71		Q_2 2	P_3 9	96.024	9	237.90	Q_1 6		
78.181	5	260.48	Q_{12}11	Q_{21}3		98.031	6	235.36	Q_{12}5		
78.662	8	259.87		Q_{23}3		98.886	1	234.28			
78.801	2	259.69		Q_{21}2		98.956	10	234.19	Q_1 5		
78.977	2	259.47			P_3 10	99.100	6	234.01		O_{23}5	
79.183	8	259.21	Q_1 11	Q_{21}1		99.981	1	232.90	P_1 15		
79.322	0	259.03			P_3 14	8900.587	6	232.13	R_1 1		
79.517	5	258.79			P_3 11	00.752	1	231.93			
79.577	3	258.71		Q_{23}2		00.855	4	231.79	Q_{12}4		
79.729	2	258.52			P_3 13	01.756	9	230.66	Q_1 4		
79.828	1	258.39			P_3 12	01.960	0	230.40	P_1 14		
80.393	1	257.68				02.735	5	229.42	P_{12}13	O_{23}6	
80.538	9	257.49		Q_{23}1		03.411	1	228.57			
80.664	1	257.33				03.565	6	228.38	Q_{12}3		
80.732	9	257.24	R_1 5			03.727	2	228.17	P_1 13		
81.939	1	255.72	Q_{12}10			04.315	1	227.43	P_{12}12		
82.877	6	254.53	Q_1 10			04.441	10	227.27	Q_1 3		
84.547	6	252.41		P_{23}2		05.191	2	226.33	R_1 0		
85.443	3	251.27	Q_{12}9			05.292	2	226.20	P_1 12		
85.076	6	250.73	R_1 4			05.557	1	225.86			
86.154	1	250.38		P_2 16		05.705	4	225.68	P_{12}11		
86.225	10	250.29		P_{23}3		06.115	7	225.16		O_{23}7	
86.329	1	250.16				06.189	2	225.07	Q_{12}2		
86.398	10	250.07	Q_1 9			06.668	5	224.46	P_1 11		
87.638	1	248.50		P_2 15		06.780	1	224.32			
87.778	8	248.32		P_{23}4		06.911	3	224.16	P_{12}10		
87.897	2	248.17		P_2 5		07.013	7	224.03	Q_1 2		
88.801	2	247.03	Q_{12}8	P_2 14		07.779	1	223.07			
89.066	2	246.69		P_2 6		07.865	3	222.96	P_1 10		
89.135	10	246.60		P_{23}5		07.940	7	222.86	P_{12}9		
89.761	7	245.81	Q_1 8			08.718	3	221.88	Q_{12}1		
89.863	2	245.68		P_2 13		08.819	5	221.75	P_{12}8		
89.976	3	245.54		P_2 7		08.902	6	221.65	P_1 9		
90.139	1	245.35				09.063	1	221.45	P_{12}9		
90.264	7	245.18		P_{23}6		09.265	3	221.19		O_{23}8	
90.541	1	244.82		P_2 12		09.466	9	220.94	Q_1 1		

λ	I	ν	Classification 1-0		
8909.556	9	11 220.83	$P_{12}7$		
09.683	1	220.67			
09.772	4	220.56	$P_{1}8$		
10.002	0	220.26	$P_{13}8$		
10.151	6	220.08	$P_{12}6$		
10.560	8	219.64	$P_{1}7$		
10.578	1	219.54			
10.637	10	219.47	$P_{13}5$		
10.859	1d	219.19	$P_{13}7$		
11.014	6	218.99	$P_{12}4$		
11.092	5	218.89	$P_{1}6$		
11.209	1	218.75			
11.303	10	218.63	$P_{12}3$		
11.409	1	218.47	$P_{13}6$		
11.504	7	218.37	$P_{12}2$		
11.565	8	218.30	$P_{1}5$		
11.64	7	218.20	$P_{12}1$		
11.741	4	218.08	$Q_{1}0$		
11.924	6	217.85	$P_{1}4$	$P_{13}5$	
12.044	1	217.69			
12.172	8	217.53	$P_{1}3$	$O_{23}9$	
12.267	2	217.41	$P_{1}0$		
12.335	4	217.33	$P_{1}2$		
12.391	6	217.26	$P_{1}1$		
14.774	2	214.26		$O_{23}10$	
15.701	1	213.07			
15.833	7	212.93	$O_{12}1$		
17.135	2	211.29		$O_{23}11$	
13.056	5	210.13	$O_{12}2$		
19.237	1	208.65		$O_{23}12$	
20.133	1	207.52	$N_{13}2$		
20.204	8	207.43	$O_{12}3$		
21.036	1	206.39		$O_{23}13$	
21.571	3	205.72	$O_{13}3$		
22.193	1	204.93			
22.271	5	204.84	$O_{12}4$		
23.559	1	203.22	$O_{13}4$		
24.041	1d	202.61			
24.244	8	202.36	$O_{12}5$		
24.505	2	202.03	$N_{13}3$		
25.485	3	200.80	$O_{13}5$		
25.972	1d	200.19			
26.122	5	200.00	$O_{12}6$		
27.332	1	198.48	$O_{13}6$		
27.887	8	197.79	$O_{12}7$		
28.892	1	196.53	$N_{13}4$		
29.063	2	196.29	$O_{13}7$		
29.529	4	195.73	$O_{12}8$		
31.040	6	193.83	$O_{12}9$		
32.052	1	192.57			
32.214	1	192.36	$O_{13}9$		
32.407	2	192.12	$O_{13}10$		
33.256	2	191.06	$N_{13}5$		
33.431	1d	190.84			
33.609	3	190.62	$O_{12}11$		
8934.654	1	11 189.31	$O_{12}12$		
35.511	1	188.23	$O_{12}13$		
37.567	1	185.66	[illegible] 6		
41.775	2	180.40	$N_{12}7$		
43.922	1	177.71			

CAPTION OF FIGURES

Figure. 1. Tube for exciting N_2 afterglow in argon

2. 0-0 band of the second positive group at various rotational temperatures

3. Transition scheme of the first and second positive groups showing the measured and analyzed bands. The numbers in the circles are the vibrational quantum numbers v. The small numbers below the circles indicate the number of steps that are required in the application of the combination principle to obtain the energies. Dotted lines show transitions without rotational analysis

4. Lambda doubling of the v = 2 level of $B^3\Pi$. Ordinates in cm^{-1}

5. $F_i(J) - BJ(J+1)$ of $B^3\Pi$ showing departure from case a. The broken lines are the asymptotes for case b

6. Intensity anomalies in the 0-0 band of the 2nd positive group. Low pressure, low temperature discharge

7. Perturbations in $v' = 1$ of $C^3\Pi$ for $F_1(21)$ and $F_2(17)$ shown by the R-branches in several bands

8. Perturbation in the $F_1(21)$ level of $C^3\Pi$ v = 1. (Left unperturbed, right actual levels.)

9. The R-branches in the 1-3 band of the second positive group. Above normal discharge, below afterglow in argon

10. R-branches in bands with $v' = 3$ showing the anomalous intensities

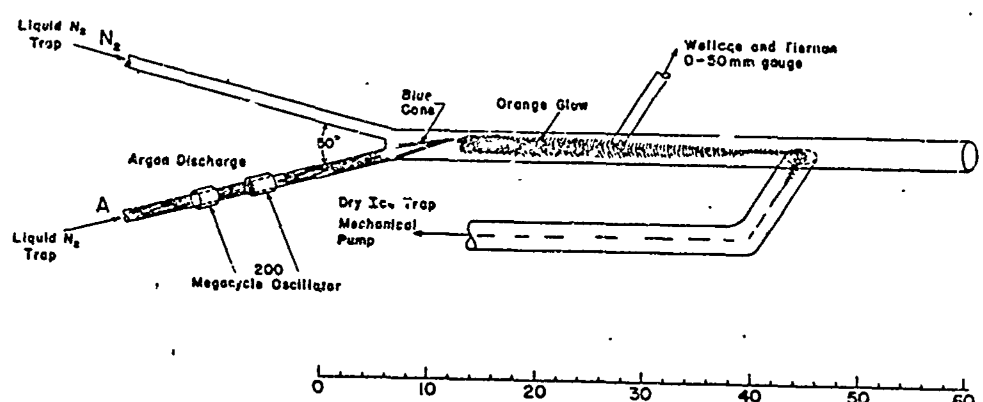

Liquid N_2 Trap
N_2
Wallace and Tiernan 0-50mm gauge
Blue Cone
Orange Glow
50°
Argon Discharge
A
Liquid N_2 Trap
200 Megacycle Oscillator
Dry Ice Trap
Mechanical Pump
0
10
20
30
40
50
60
cm

Fig. I.

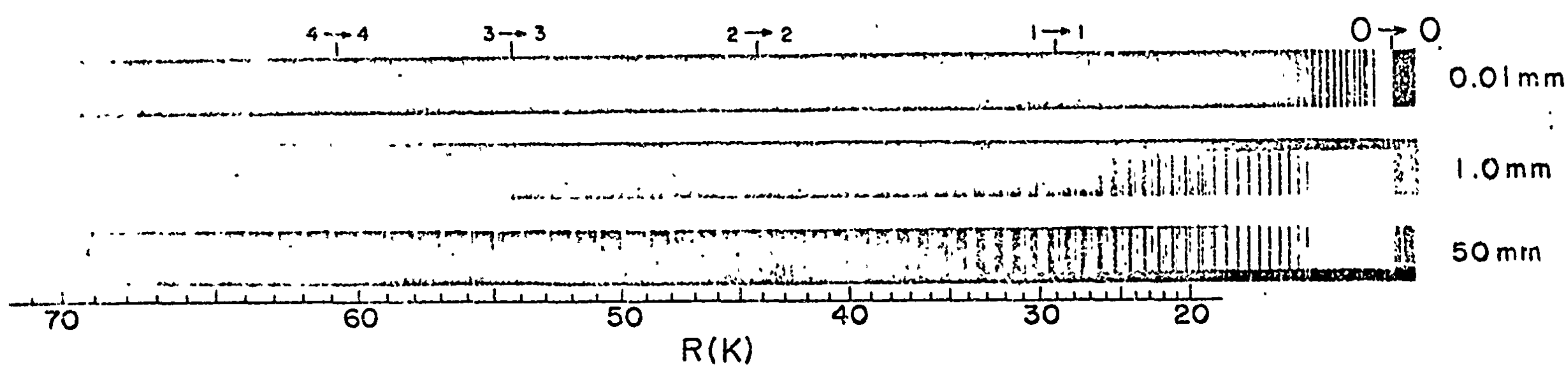


Fig. 2.

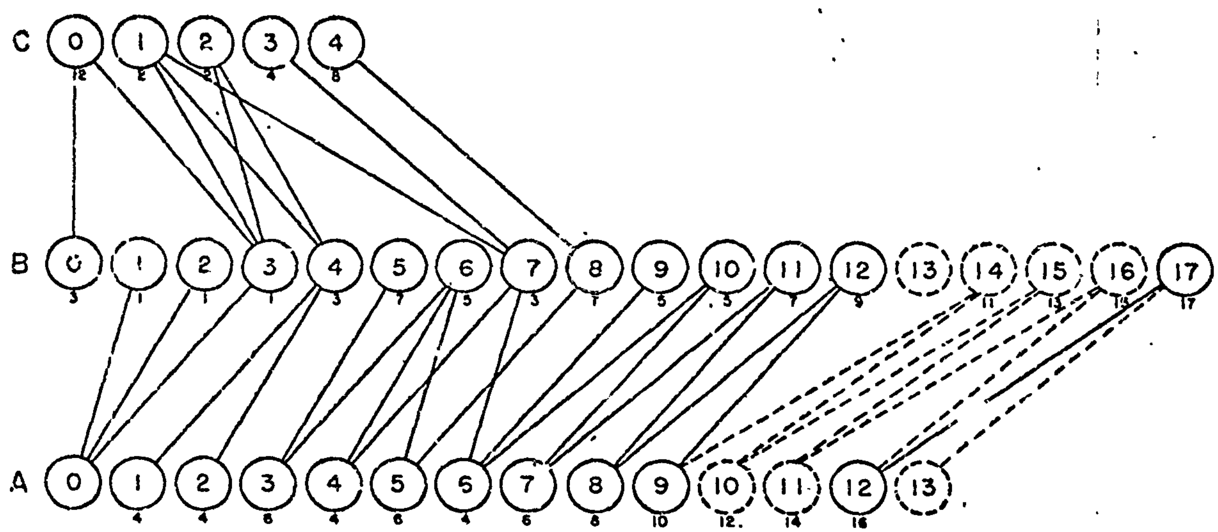


Fig. 3.

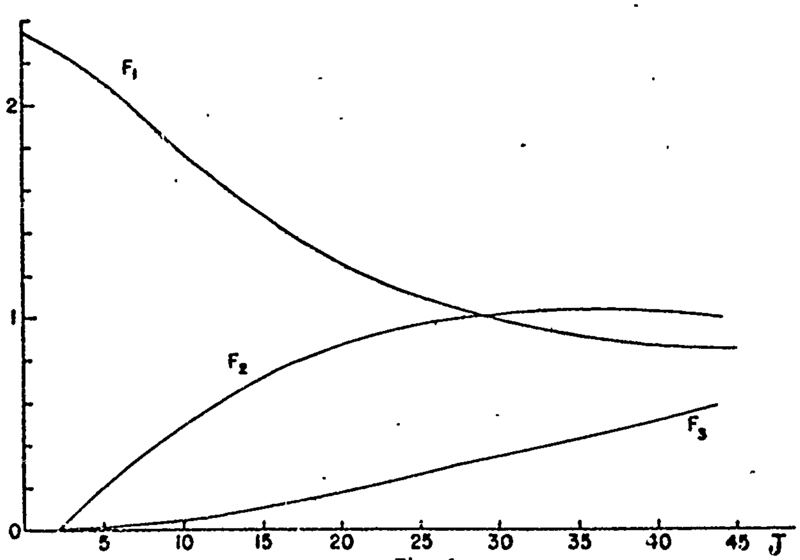


Fig. 4.

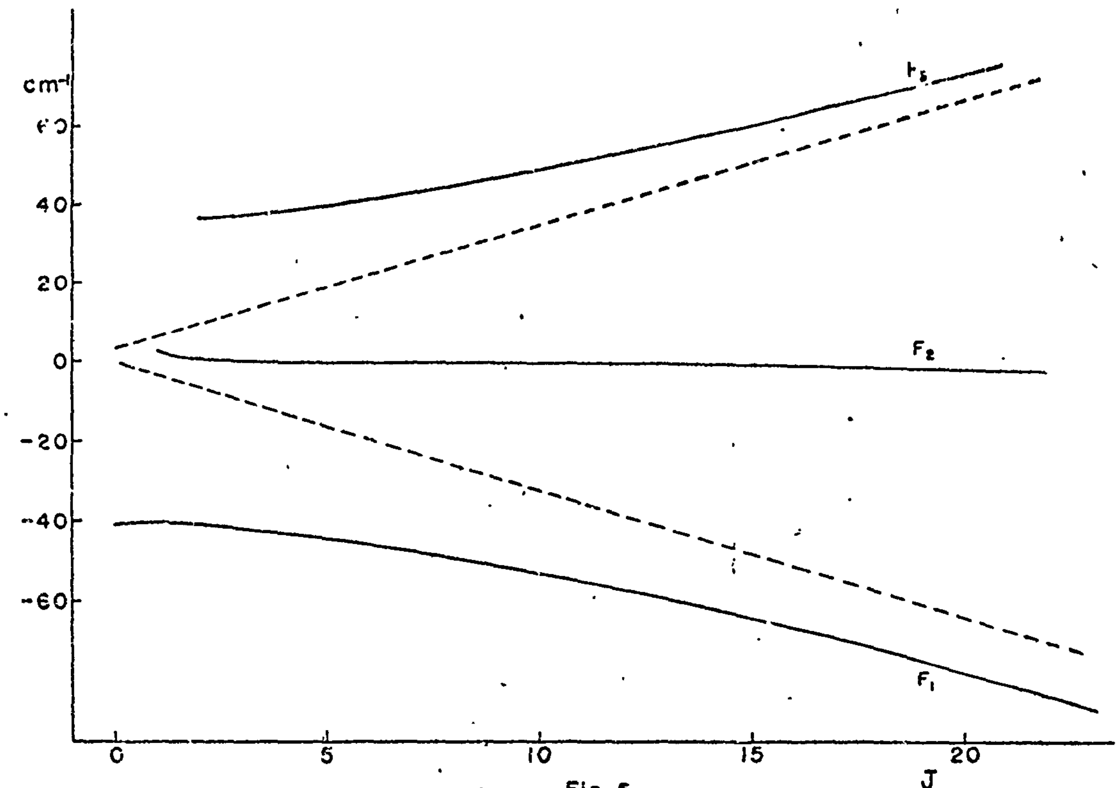


Fig. 5.

0 → 0

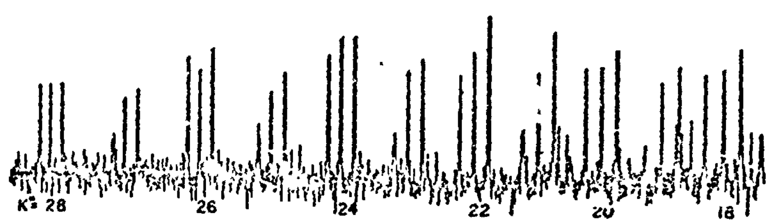
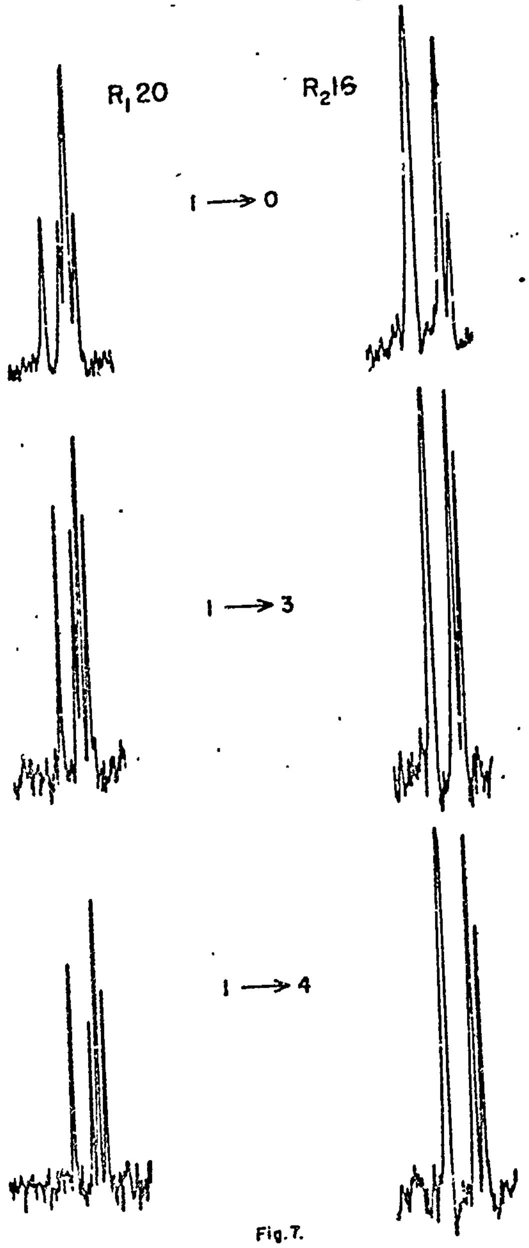


Fig. 6.



$R_1 20$
$R_2 16$
$1 \longrightarrow 0$
$1 \longrightarrow 3$
$1 \longrightarrow 4$

Fig. 7.

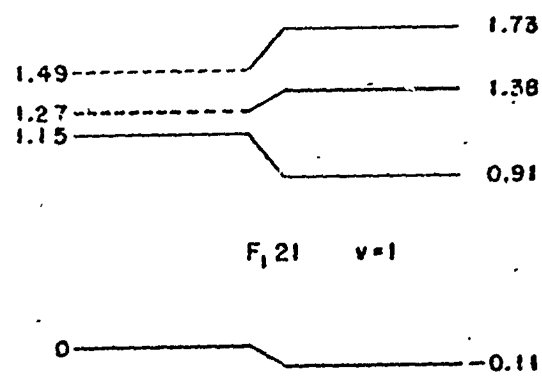


Fig. 8.

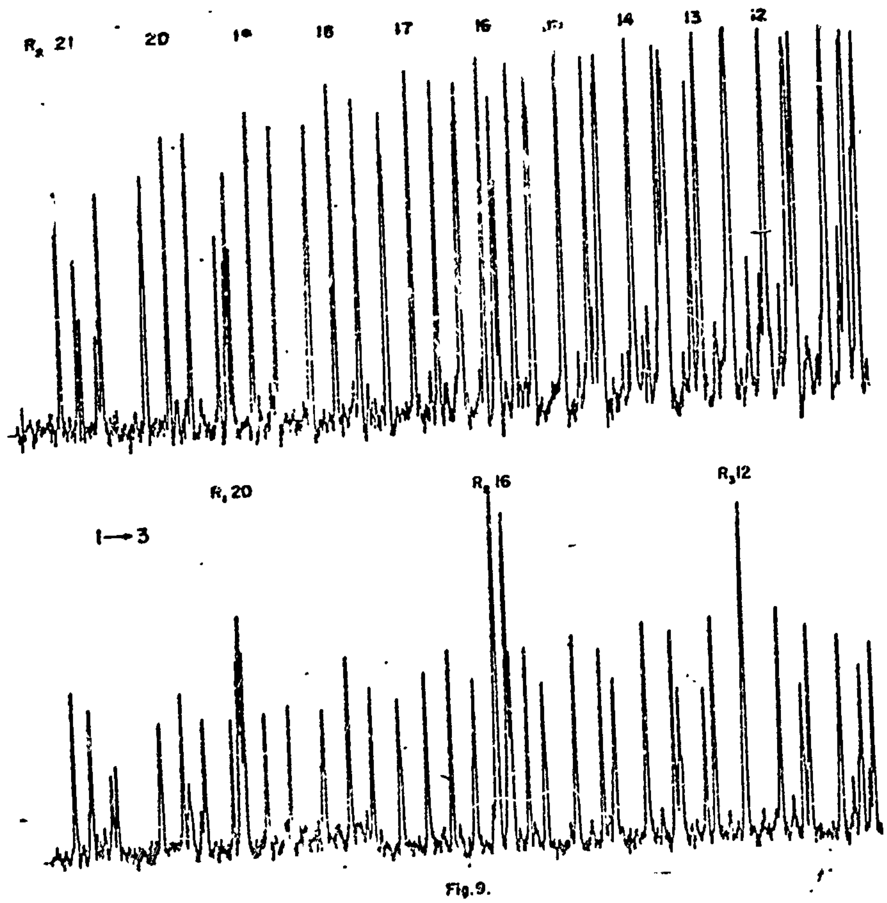
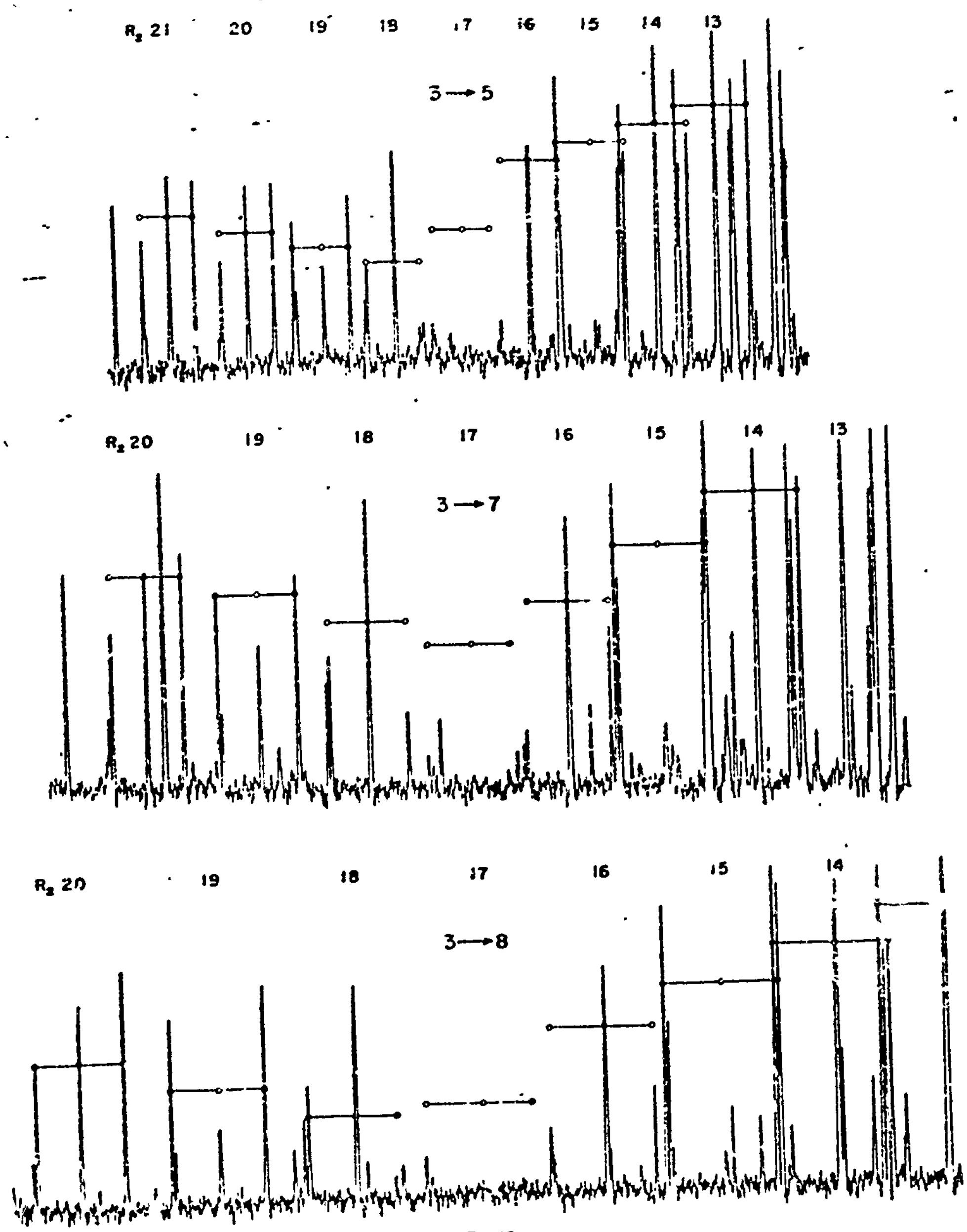


Fig. 9.



R_2 21 20 19 18 17 16 15 14 13
3 → 5
R_2 20 19 18 17 16 15 14 13
3 → 7
R_2 20 19 18 17 16 15 14
3 → 8

Fig. 10.

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